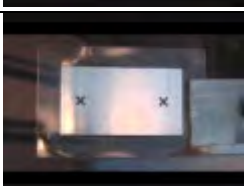


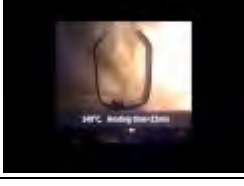
Shape memory effect and shape memory technology	
PMMA for active disassembly	http://www.youtube.com/user/activedisassembly1#p/u or http://u.youku.com/user_video/id_UMzYzODc5NDg0.html
Shape memory polymers for active disassembly	http://www.youtube.com/user/SMM20110812#p/u
Shape memory alloys	
Shape memory polymers	
Shape memory hybrids	
Shape memory material morphing wings	
Medical applications of shape memory materials	
One-way/two-way shape memory effect	
Multiple-shape memory effect in shape memory materials	
Shape memory effect in materials	
Miscellaneous	
Insects	
Retractable/deployable structures	
Hydrogels	
Morphing	
Devices for touch screen	
Buttons-on-demand	
Interesting technologies	
3D/4D printing	
Instruction	
Fun	

Active disassembly and programmed active disassembly

Material: PMMA	Purnawali H, Xu WW, Zhao Y, Ding D, Wang CC, Huang WM and Fan H, Poly(methyl methacrylate) (PMMA) for active disassembly, <i>Smart Materials</i>	Reference
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and Structures, Vol. 21, 2012, 075006

Active PMMA joint PMMA 自拆卸接头	http://www.youtube.com/watch?v=M_p6qzoDGmc http://v.youku.com/v_show/id_XMjkzNzA0NDQw.html	
Active PMMA screw PMMA 自拆卸螺丝	http://www.youtube.com/watch?v=rie_Zq2dVl0 http://v.youku.com/v_show/id_XMjkzNzA1MTI4.html	
Active PMMA snap-fit 自拆卸用 PMMA 卡扣	http://www.youtube.com/watch?v=FekHnnv4p7Y http://v.youku.com/v_show/id_XMjkzNzA2NDk2.html	
Active PMMA tab 1 自拆卸用 PMMA 卡扣	http://www.youtube.com/watch?v=OAq8QuB1FKA http://v.youku.com/v_show/id_XMjkzNzA5MDY4.html	
Active PMMA tab 2 自拆卸用 PMMA 卡扣	http://www.youtube.com/watch?v=9P1BVRR1UhM http://v.youku.com/v_show/id_XMjkzNzEwMjQ4.html	
Programmed AD – PMMA box 自拆卸 PMMA 盒子	http://www.youtube.com/watch?v=g5e49utaFWs http://v.youku.com/v_show/id_XMjkzNzEwNjc2.html	

Material: ABS/PC	Case material of Nokia's mobile phone	(2011-2012 FYP)
Programmed active disassembly _A	http://youtu.be/C2XQ2sHbSWc	
Programmed active disassembly _B	http://youtu.be/0d81KtnZq8s	
Programmed active disassembly _C	http://youtu.be/ckE8Nb1ykGs	

Shape memory polymers for active disassembly

SMP for active disassembly A	http://www.youtube.com/watch?v=7Z_5Qd_kZzs	
SMP for active disassembly B	http://www.youtube.com/watch?v=ujtLSnyQCxU	

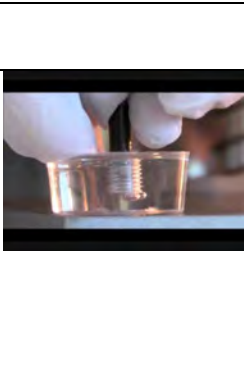
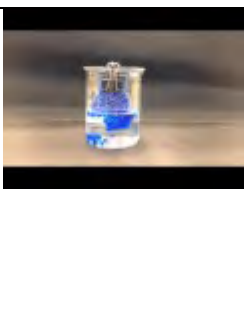
Reference(s):

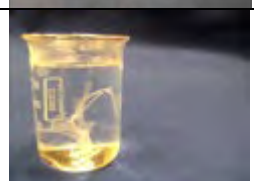
Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640

Reference(s):

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640

SMP for active disassembly C	http://www.youtube.com/watch?v=ZlCtEU12Xzn0 Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMP for active disassembly D	http://www.youtube.com/watch?v=qKBZuSzddfU Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMP for active disassembly E	http://www.youtube.com/watch?v=OAsMjI_0lly Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMP for active disassembly F	http://www.youtube.com/watch?v=iXthG2pD7-w Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMP for active disassembly G	http://www.youtube.com/watch?v=yUemywV8Xt4 Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMP for active disassembly H1 [strength test, with pre-compression]	http://www.youtube.com/watch?v=K75SAqH_aB8 Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

SMP for active disassembly H2 [strength test, without pre-compression]	http://www.youtube.com/watch?v=2yLwq-W2Mk8 Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	
How to DIY shape memory polymer screw?	http://youtu.be/d8T6BR7VKg4	
Active disassembly based on the shape memory effect in polymeric materials (Demo) - (Programmed) active disassembly of components - Active disassembly of materials	http://youtu.be/obVzuviyhVA	
Active disassembly of polymeric components - To disassemble components/elements into particles for reusing. - A 2014/15 FYP	http://youtu.be/42FvHMZJc-Q	

Active dis-assembly of a component into small elements: proof of concept - Material: ABS filament used in 3D printing	http://youtu.be/-L08UMn93M0	
Active disassembly of PCL component into small pieces - Proof of concept: active dis-assembly for recycling	https://youtu.be/JaGuMADS_HY	
Active dis-assembly of twisted PU filament - A potential way for recycling?	https://youtu.be/7kqylmyp84M	

Reference(s):

Huang, W.M., Yang, B. and Fu, Y.Q., *Polyurethane shape memory polymers*, Taylor & Francis/CRC Press, 2011

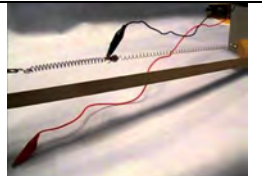
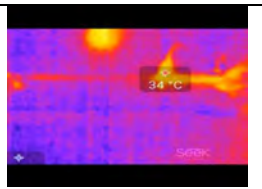
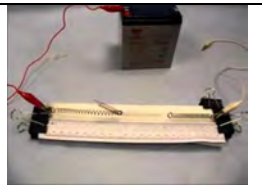
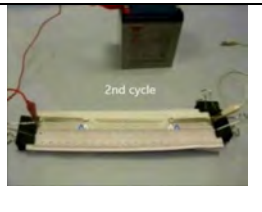
Huang et al Thermo-moisture responsive polyurethane shape-memory polymer and composites: a review, *Journal of Materials Chemistry*, Vol. 20, 2010, pp3367-3381

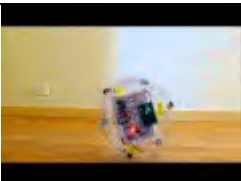
Purnawali H et al, Poly(methyl methacrylate) (PMMA) for active disassembly, *Smart Materials and Structures*, Vol. 21, 2012, 075006

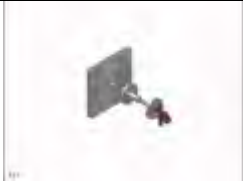
Sun L, et al, Shape memory technology for active assembly/disassembly: fundamentals, techniques and example applications, *Assembly Automation*, Vol. 34, No.1, 2014, 78-93

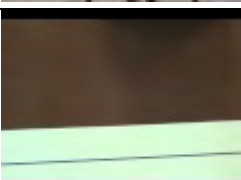
Shape memory alloys

SMA inchworm A	http://www.youtube.com/watch?v=qmztarUHjOY Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	
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Biased and two-way shape memory alloy actuators - One shape memory alloy spring vs. one normal spring; two shape memory alloy springs	http://youtu.be/g8oS8rzAQXk	
Testing of nitinol spring(s) using a hot blower	https://youtu.be/Mp1spttfJ3k	
Local heating and buckling of SMA spring	https://youtu.be/63zd4SBVbcU	
Testing of 9 V battery activated nitinol SMA spring(s) - Including infrared video	https://youtu.be/NIMymR22ouY	
Testing of triple springs in series - 1 SMA + 1 normal + 1 SMA, 12 V battery	https://youtu.be/FEDX8Jkb6uI	
Motion study of joule heated springs (SMA1, elastic, SMA2) - SMA1 and SMA2 are nitinol springs with different transition temperatures.	https://youtu.be/kawCRgnmzC0	

SMA inchworm B	http://www.youtube.com/watch?v=1-oJxYzzeCc	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA 4-bar linkage	http://www.youtube.com/watch?v=6fzfdIp_IV0	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA micro boat	http://www.youtube.com/watch?v=hNTn0IMYu3Q	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA rolling car (1 st version)	http://youtu.be/MFM-nVWJtA4	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA rolling car A	http://www.youtube.com/watch?v=X65mrEjH6Ig	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA rolling car B	http://www.youtube.com/watch?v=bV0AGy0PSew	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

SMA rolling car C	http://youtu.be/O2ty3DH2j9k	
SMA activated rolling ball (2011/2012 Final year project)	http://youtu.be/0X-9pteHHJk	
SMA linear actuator	http://www.youtube.com/watch?v=nzjDNR6WT50 Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA driven platform with multi-degree-of-freedom	http://www.youtube.com/watch?v=CGdAzD-EICo Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA gripper (atop a SMA driven platform with multi-degree-of-freedom)	http://www.youtube.com/watch?v=7bGzy6RhQ5s Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA gripper (atop a SMA driven platform with multi-degree-of-freedom (assembly))	http://www.youtube.com/watch?v=WS860WVz7ik Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

SMA heat engine (using hot water and 4 NiTi springs)	http://youtu.be/3vYO-fwJyoo	
SMA heat engine (using hot water)	http://www.youtube.com/watch?v=jCK9643gFBk Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA heat engine (using sunlight)	http://www.youtube.com/watch?v=I8878rX9zcw Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA heat engine (using sunlight) [+animation]	http://www.youtube.com/watch?v=zQlyp9Ua7oY Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA for crack closure and shape restoration A	http://www.youtube.com/watch?v=sZ1yiQrKjZo Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA for crack closure and shape restoration B (temperature distribution in SMA wire)	http://www.youtube.com/watch?v=CfERGFviKvM Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

Joule heating NiTi SMA wire

<http://youtu.be/424-3G0jNqU>



Playing with superelastic Nitinol

<http://youtu.be/nm2o8fhSkss>



Shape fixing and increasing transition temperature of superelastic Nitinol

- Fix a new permanent shape;
- Increase transition temperature for the shape memory effect



Training superelastic Nitinol to have two-way SME

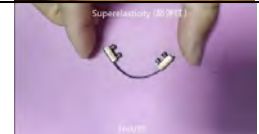
<http://youtu.be/GIonYwrBRdU>

- Applicable to SME Nitinol as well.



Super-elasticity and shape memory effect in NiTi SMA wire

<https://youtu.be/Coej1GvYo18>



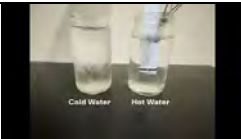
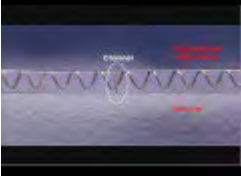
SMA mimosa

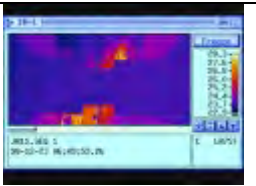
<http://www.youtube.com/watch?v=c4ohr76LvOw>

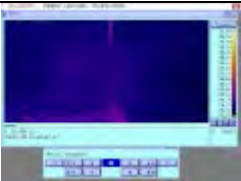
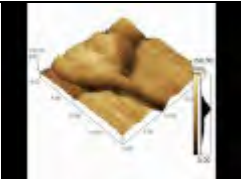
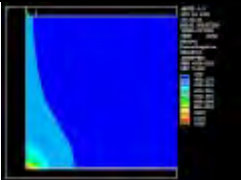
Reference:

Sun et al, Stimulus-responsive shape memory materials: a review,
Materials and Design, 33, 2012, 577-640

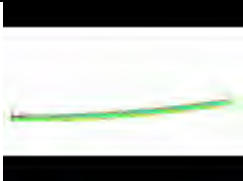


Bi-Stable Buckling Strip	http://youtu.be/7GE68366chc	
- Joule heating SMA wires for actuation		
Buckling of shape memory alloy wire in constrained recovery upon thermal cycling	https://youtu.be/gWqizg1rkNM	
SMA wire	http://youtu.be/792eJW6rTQM	
Nitinol activated devices	http://youtu.be/pZ410HFLJA	
- Some old stuffs		
SMA star shaped ring	http://youtu.be/6eGUITSU9IY	
Closure of a hole in silicone upon joule heating embedded SMA spring	http://youtu.be/LtWPvWXu5Sw	
Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640		

Heating Nitinol spring with straw inside	http://youtu.be/IIJdecanCvc	
Phase transformation front in NiTi plate -Upon loading and unloading at 10^{-3} /s	http://youtu.be/-IMiEXg7g88	
Phase transformation front movement in 1 mm diameter NiTi SMA wire A - upon stretching (strain rate: 10^{-3} /s)	http://youtu.be/RUPzz9J3tg4 References: Huang, W.M., Transformation front in shape memory alloys, <i>Materials Science and Engineering: A</i> , Vol. 392, No. 1-2, 2005, pp121-129 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Phase transformation front movement in 1 mm diameter NiTi SMA wire B - upon stretching (strain rate: 10^{-4} /s)	http://youtu.be/hPY1fUE4j9k References: Huang, W.M., Transformation front in shape memory alloys, <i>Materials Science and Engineering: A</i> , Vol. 392, No. 1-2, 2005, pp121-129 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Impact induced phase transformation front movement in SMA (1 Kg) - 1 mm diameter NiTi wire	http://youtu.be/9V69JtUhejo Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

Impact induced phase transformation front movement in SMA (1.5 Kg)	http://www.youtube.com/watch?v=XX15aAa54ME&feature=youtu.be	
- 1 mm diameter NiTi wire	Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Impact induced phase transformation front movement in SMA (2 Kg)	http://youtu.be/jQ68CCxjZrI	
- 1 mm diameter NiTi wire	Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Evolution of surface morphology in NiTi thin film upon thermal cycling	http://youtu.be/3WiIXJQ3434	
	Reference: Wu, M.J., Huang, W.M., Fu, Y.Q., Chollet, F., Hu, Y.Y., Cai, M.D., Reversible surface morphology in shape-memory alloy thin films, <i>Journal of Applied Physics</i> , Vol. 105, 2009, 033517	
Reversible wrinkling atop NiTi thin film upon thermal cycling	http://youtu.be/t0vRRPh42EU	
	Reference: Wu, M.J., Huang, W.M., Fu, Y.Q., Chollet, F., Hu, Y.Y., Cai, M.D., Reversible surface morphology in shape-memory alloy thin films, <i>Journal of Applied Physics</i> , Vol. 105, 2009, 033517	
Simulation of laser annealing NiTi thin film	http://youtu.be/Stkwvr3skTE	
	References: Miyazaki, S., Fu, Y.Q. and Huang, W.M. (Ed.), <i>Thin film shape memory alloys—fundamentals and device applications</i> , Cambridge University Press, 2009 He, Q., Huang, W.M., Gao, X.Y. and Hong, M.H., Numerical investigation of CO ₂ laser heating for annealing Ni/Ti multilayer thin films, <i>Smart Materials and Structures</i> , Vol. 14, 2005, pp1320-1324 He, Q., Hong, M.H., Huang, W.M., Chong, T.C., Fu, Y.Q. and Du,	

	H.J., CO ₂ laser annealing of sputtering deposited NiTi shape memory thin films, <i>Journal of Micromechanics and Microengineering</i> , Vol. 14, 2004, pp950-956	
Laser annealing NiTi thin film (a line) upon heating	http://youtu.be/NmFBJ8XoHN4	
	References: Miyazaki, S., Fu, Y.Q. and Huang, W.M. (Ed.), <i>Thin film shape memory alloys—fundamentals and device applications</i> , Cambridge University Press, 2009 He, Q., Hong, M.H., Huang, W.M., Chong, T.C., Fu, Y.Q. and Du, H.J., CO ₂ laser annealing of sputtering deposited NiTi shape memory thin films, <i>Journal of Micromechanics and Microengineering</i> , Vol. 14, 2004, pp950-956	
Thin film NiTi/silicon beam (two positions) -gradually joule heating/cooling	http://youtu.be/NSr5y9x4Pps Reference: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i> , Vol. 114, No. 1, 2004, pp118-122	
Thin film NiTi/silicon beam (two positions) [side view] - joule heating/cooling [3.2 mm long] (low current)	http://youtu.be/lyAxu0oD-JY Reference: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i> , Vol. 114, No. 1, 2004, pp118-122	
Thin film NiTi/silicon beam (three positions) -rapid joule heating (high current)	http://youtu.be/l8CcWn4YVgI Reference: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i> , Vol. 114, No. 1, 2004, pp118-122	
600 micron thin film NiTi_silicon beam	http://youtu.be/N-nVhnffLRo Reference: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i> , Vol. 114, No. 1, 2004, pp118-122	

1600 micron thin film NiTi_silicon beam	http://youtu.be/ImIBXN6dbZk	
FEM simulation of NiTi_silicon beam	http://youtu.be/72G3sg_zPcc	
Thin film NiTi/silicon gripper	http://youtu.be/CZMb8604WlU	
- 1.6 mm long, 20 micron thick beam	References: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i>, Vol. 114, No. 1, 2004, pp118-122 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	
Joule heating Thin film NiTi/silicon beam A - 1.6 mm long, 5 micron NiTi atop 15 micron silicon beam (laser cutting to form circuit)	http://youtu.be/w9ymSjUkfpQ References: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i>, Vol. 114, No. 1, 2004, pp118-122 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	
Joule heating Thin film NiTi/silicon beam B - 5 micron NiTi atop 15 micron silicon beam (laser cutting to form circuit) [smallest 0.6 mm long]	http://youtu.be/lGxSBbPjV80 References: Huang, W.M., Liu, Q.Y., He, L.M. and Yeo, J.H., Micro NiTi-Si cantilever with three stable positions, <i>Sensors and Actuators A</i>, Vol. 114, No. 1, 2004, pp118-122 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	

An introduction to various shape memory phenomena in shape memory alloys (SMAs) <http://youtu.be/xhykVMFDULk>



An introduction to shape memory alloy rotary devices <http://youtu.be/TdhmP2dKWIE>



Buttons-on-demand <https://youtu.be/86H1iKpZXSs>



Buttons on demand (20231011) https://youtu.be/1R_42aDXj7I



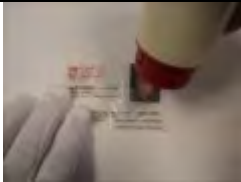
Buttons-on-demand (concept) <https://youtu.be/sJ5sGYzbh38>

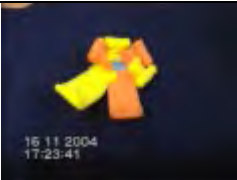
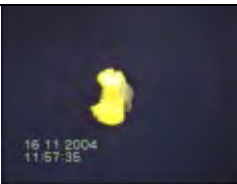


Control activation of shape memory spring via mobile phone <https://youtu.be/cYtFMWShoII>



Shape memory polymers

Shape memory effect in PU SMP A	http://youtu.be/NeiECH2RCCw	
Shape memory effect in polyurethane card	http://youtu.be/aD5S_JxCzGY	
Shape memory name card - Using normal material	http://youtu.be/Q6X81YQrZ4s	
Shape memory effect in PU SMP B	http://youtu.be/YawCZnrZOl4	
SME in thermo-responsive SMP A	http://www.youtube.com/watch?v=OB_dpL7RR-I Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640 Huang et al Thermo-moisture responsive polyurethane shape-memory polymer and composites: a review, <i>Journal of Materials Chemistry</i> , Vol. 20, 2010, pp3367-3381	
Shape recovery in PU SMP 001	http://youtu.be/pwR_xpJjP_s	

Shape memory flower (real flower with polymer coating)	https://youtu.be/Tyz3MUVvfZU	
Shape recovery in PU SMP 002	http://youtu.be/beb1UG55qKQ	
Shape recovery in PU SMP 003	http://youtu.be/q_j1a88sZoU	
Shape recovery in PU SMP 004	http://youtu.be/F_VLIDlzSg8	
Shape recovery in PU SMP 005	http://youtu.be/m5eCDGhKnUo	
Shape recovery in PU SMP 006	http://youtu.be/7MyEQGIlhWE	

Shape recovery in PU SMP 007

<http://youtu.be/NFIGsYiV59s>



Shape recovery in PU SMP 008

<http://youtu.be/G-wieECBNmY>



Testing body/room temperature-responsive shape memory polyurethane <https://youtu.be/-sRi80X2QIQ>



Hand-temperature activated shape recovery

<https://youtu.be/OjkzFwTlMrE>

- Material: polyurethane



Shape memory effect in PCL

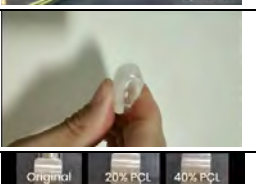
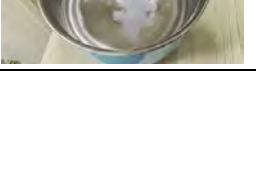
<http://youtu.be/n7qmmlPTspE>

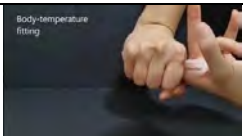


The shape memory effect in PCL A

<http://youtu.be/U0S8XRkZ33I>



Pre-stretched PCL thin wire in hot water	http://youtu.be/7S5Pg1BdS5s	
- Electrospinning produced PCL wire		
Shape recovery of cross linked PCL	https://youtu.be/K9rWRfE9hms	
- In hot water		
Dancing of cross linked PCL	https://youtu.be/sq4TyEJJfbY	
- Chemo-responsive SME in PCL		
Chemo/heat-responsive SME in cross-linked PCL	https://youtu.be/ZisnUk5geEE	
Transparent/elastic body temperature re-shapeable polymer(polycaprolactone, PCL)	https://youtu.be/dxD1LQVJ67M	
Modified Formlabs' elastic resin for high mechanical performance	https://youtu.be/X3e7qMLk4h0	
UV resin for body temperature programming	https://youtu.be/FCyzCHwvPjs	

Hybrid resin w/wo UV cross linking	https://youtu.be/sSXdGzX6qkI	
UV cross-linkable, body-temperature programmable shape memory resin for 3D printing	https://youtu.be/pWwB_YZDKj4	
Body temperature programmable shape memory polymer: UV 3D printable version	https://youtu.be/TXs7EEqsSFA	
Finger splint using UV cross linked body-temperature programmable shape memory hybrid	https://youtu.be/aoKyiiUwZx4	
VAM of body temperature programmable shape memory hybrid: proof-of-concept	https://www.youtube.com/watch?v=zdF3-ew5oFQ	
Hot programming of 3 polymers	https://youtu.be/wLOMyK2-GKE	
SME in moisture-responsive SMP A	http://www.youtube.com/watch?v=L86ybNjWwZQ Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640 Huang et al Thermo-moisture responsive polyurethane shape-memory polymer and composites: a review, <i>Journal of Materials Chemistry</i> , Vol. 20, 2010, pp3367-3381 Huang et al, Water-driven programmable polyurethane shape memory polymer: demonstration and mechanism, <i>Applied</i>	

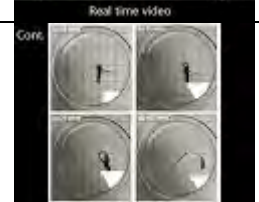
Water droplet atop PU (rapid swelling)

https://youtu.be/qIOy9c_tzxI



Wetting and drying of swelling PU composite

<https://youtu.be/N7KntbmAzrQ>



Bending via wetting

https://youtu.be/KQ8_4n-Zh2Y



Heating responsive SME in PU wire

<http://youtu.be/2hfkgOtgPgM>

- With/without constraint



Pre-stretched PU in tube with ethanol

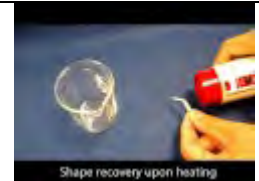
<http://youtu.be/v-RxFDuXrLY>



Reset the permanent shape of a shape memory polyurethane

<https://youtu.be/59DannEV-Bc>

- A revisit.
- Preliminary investigation.
- Material: TPU.



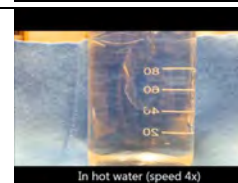
Set the permanent shape of a TPU by hands
(Recorded in Dec. 2014)

<https://youtu.be/2AO-IJ86JvE>



The SME in redox glue (in hot water)

<http://youtu.be/E9BNy59RSPE>



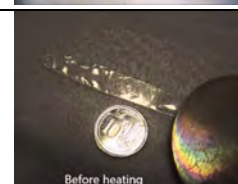
Heating responsive SME in redox glue

<http://youtu.be/x-rMqz2x18o>



Heating responsive SME in redox glue(coin version)

<http://youtu.be/n4a8r4hNW0I>



Water-responsive SME in cellulose

<http://youtu.be/GB4ewjmzqkc>



Water activated rapid shape recovery in cellulose

<https://youtu.be/iAFHeEofrN4>



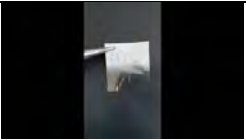
Comparison of water absorption speed in cellulose
foam w/wt PVA glue treatment

<https://youtu.be/MsDmSTxnVP4>



Comparison of water-responsive shape recovery in cellulose w/wo PVA glue treatment	https://youtu.be/g0EuJznaStA	
Rapid water-responsive shape recovery in cellulose sponge (untwisting mode)	https://youtu.be/v1t2i-jmEts	
Twist dry cellulose sponge and then wet by water for shape recovery	https://youtu.be/EFuQpgndJYc	
PU SMP under stretching at room temperature	http://www.youtube.com/watch?v=niX4cjFx_do	
Refreshable SMP Braille paper A	http://www.youtube.com/watch?v=B0hQaDfqBAE Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Refreshable SMP Braille paper B	http://www.youtube.com/watch?v=-6cMpYtWWyE Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

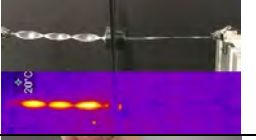
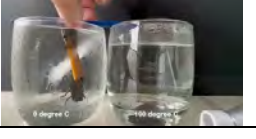
Refreshable SMP Braille paper C	http://www.youtube.com/watch?v=nLib-d-7ZaE	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Write-on transparency film as refreshable braille paper for the blind	http://youtu.be/vK8lVeigg6s	
Heating pre deformed write on OHP transparency film	http://youtu.be/ogZaPQQPUV4	
Shape memory effect in overhead transparency	http://youtu.be/5MAAr6bmtdo	
SME in transparency after color-printed	http://youtu.be/2qZH-dfBXIM	
Removal of crease and stress whitening atop plastic membrane	https://youtu.be/SqBFpHeofmQ	

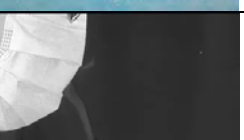
Shape memory effect and white/transparent transition in PVC transparent film	https://youtu.be/TFzO76zbGyw	
Transformer using SMP form	http://www.youtube.com/watch?v=AncQTeftvjk Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Shape recovery in a PU foam upon heating	http://youtu.be/G8Y79LcqNP0 Reference(s): Tey, S.-J., Huang, W.M. and Sokolwski, W. M., On the effects of long term storage in cold hibernated elastic memory (CHEM) polyurethane foam, <i>Smart Materials and Structures</i> , Vol. 10, No. 2, 2001, pp321-325	
The shape memory effect in PU foam - polyurethane foam deformed at room temperature	http://youtu.be/5HnAqFFby3A	
The SME in toothbrush cover bag	https://youtu.be/tO2IMA7yAFM	
Testing of a plastic food packaging bag	https://youtu.be/4-6gKIXPvs4	

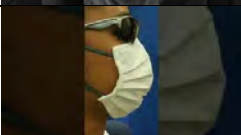
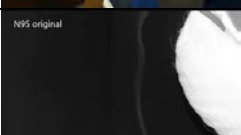
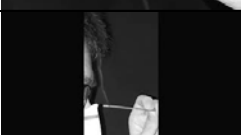
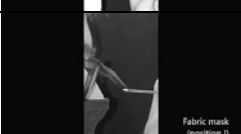
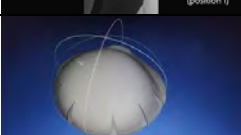
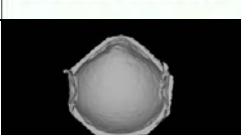
Testing of plastic packaging tea bag	https://youtu.be/bEO9YVENFXy	
Testing of plastic packaging bag (white coffee)	https://youtu.be/kmfQ-HrjRgw	
Testing SME in a flexible/soft tape after impression and stretching	https://youtu.be/zDKg26T1bBI	
Repeat, rapid & comfort fitting elastic insole - Different from memory foam type of insole. - Simply step-on to get a pair of elastic insole, just for you and only fit you.	http://youtu.be/q6f5BNWya4Y	
Comparison of elastic, memory and shape memory insoles	http://youtu.be/lYEgzMVi2AM	
Cannot find the right size? Why not let shoes fit you.	http://youtu.be/U04muHhAsfo	

Easy fitting shoes - Simplified version	http://youtu.be/Uv7eD221bO0	
Comfort fitting shoes V2 - No size, no left/right, just wear it and then it will fit your size for as long as you wish.	http://youtu.be/J6_rSZlMkuE	
3D animation of comfort fitting shoes Comfort fitting at any time, whenever you want. Single size; No right/left side.	http://youtu.be/E_puXEvCNsc	
Comfort fitting shoes (sock version to proof of concept)	http://youtu.be/vz8Wa7gkLGY	
Comfort fitting shoes [June 2015]	http://youtu.be/PINbNBUR5ks	
Testing of the shape memory effect in a EVA foam	https://youtu.be/pJz5FZh2Rro	

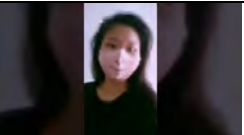
Shape memory shoes for comfort fitting 20151014 - Proof of concept	https://youtu.be/e99wNlrH5Qo	
Comfort self-fitting shoes 20160211	https://youtu.be/QGvyQKulGUU	
Comfort self-fitting shoes (video) 20160212	https://youtu.be/Pq200IpqO3M	
Single sized shoes 20160310 - PCT filed	https://youtu.be/nF7j5wiXobQ	
Single sized shoes 20160329 - Proof of concept	https://youtu.be/hHhRjeTnr_0	
Single sized shoes 20160412	https://youtu.be/Nqt_AKLvXKg	

Single sized shoes 20160419	https://youtu.be/VqaYyZmizsg	
Single sized shoes 20160503	https://youtu.be/RiUIVeMB2mg	
Rapidly personalized soft elbow pad (proof of concept) — Heat to 65 Deg C for softening, wear it when it is not too hot. After cooling back to room temperature, Bingo.	https://youtu.be/k2scmjfkUs	
Testing of two way shape memory polymer: biased twisting polymeric actuator (20221019)	https://youtu.be/EYg-dEqWo5g	
Two-way SMP based actuators	https://youtu.be/19Z43NAjaIU	
Two-way SMP+Al strip: under thermal cycling	https://youtu.be/YO_CopAEjYQ	
Thermal cycling in hot and cold water (20% pre-strained)	https://youtu.be/f86i5wedqy0	

Upon gradual cooling in water (25% ore-stretched)	https://youtu.be/4ILfNpOr6vc	
Buckling of pre-stretched cross-linked EVA upon cooling	https://youtu.be/1bHcczeBpfo	
Buckling upon thermal cycling between 30-90 deg C (water) (original speed)	https://youtu.be/EfhM7VJlm-M	
2 way EVA constrained recovery upon thermal cycling between 30-90 Deg C (speed 4x)	https://youtu.be/bTE7xT1qYMY	
Thermal cycling of 2 way EVA between 0-95 deg C water	https://youtu.be/9iz020g7X7I	
Thermal cycling in hot and cold water (40% prestrained, refixed)	https://youtu.be/4ILfNpOr6vc	
Permeability test	https://youtu.be/mf17j8PeNLY	
(Smoke test) surgical mask	https://youtu.be/SIWdjEwSRVw	

(Smoke test) fabric mask	https://youtu.be/Yw-ArUD2fj8	
non-sliding mask	https://youtu.be/3-RmgoUva2M	
Non-sliding mask (20210825)	https://youtu.be/s1oTAmhbJvs	
(Smoke test) N95 (original)	https://youtu.be/G6RgDrw8Y9M	
(Smoke test) N95 (modified)	https://youtu.be/SKxvT6VnbpM	
(Smoke test) Nose area (comparison)	https://youtu.be/G3VVFb2Jees	
Comfort fitting shape memory N95 mask	https://youtu.be/qtLnkIGV7wk	
Body-temperature comfort fitting shape memory N95 mask	https://youtu.be/6RI7aR9lWCk	
Instant fitting N95 mask	https://youtu.be/H9_tmnbDEZ0	

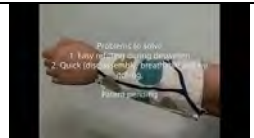
Redesign N95 for instant comfort fitting	https://youtu.be/wWPwfhi8s	
Comfort fitting N95 masks (modified with silicone or PCL) [smoke test]	https://youtu.be/BKvXe_6Nnjg	
Rapidly customized facial mask at body temperature	https://youtu.be/omOeDcqFIUs	
Rapidly customized facial mask at body temperature (results)	https://youtu.be/hDzFitRYu7E	
A closer look of facial mask via rapid comfort fitting	https://youtu.be/IwFPcab-TC4	
Personalized invisible mask	https://youtu.be/FblPgwbIHU	
Rapid comfort fitting mask	https://youtu.be/uw_rBNfuuYU	
My own mask	https://youtu.be/JYwzgRtST7c	

Real face mask (original without modification)	https://youtu.be/iYJ0VR-tQ2Y	
Redesign mask: Anti-theft sweep face/防盜刷臉口罩	https://youtu.be/dho3bC5M2qU	
3D real face mask	https://youtu.be/zJzDfmogJ0I	
Mask animation 20200903a	https://youtu.be/iRWREAoaIKs	
Elastic magnetic shape memory ring	https://youtu.be/E2avcqZzNKI	
Body-temperature programmable wrist watch	https://youtu.be/3eVmsTYRpAo	
Comfort fitting wrist watches: proof of the concept	https://youtu.be/jK5h8a-h44M	
Body-temperature comfort fitting magnetic wrist ring and watch	https://youtu.be/yOodpEO-H9Y	

Body-temperature comfort fitting magnetic wrist ring	https://youtu.be/ImXWvU90K3g	
Comfort fitting magnetic wrist ring	https://youtu.be/OJvezLoIX-w	
Fitting magnetic wrist watch	https://youtu.be/VtuZA1Dqacw	
FDM printed mesh for comfort fitting	https://youtu.be/-LH1TefGtRE	
Body temperature rapid comfort fitting 20200308	https://youtu.be/JuyiWuelZvo	
Comfort fitting wrist keyboard	https://youtu.be/2Y6LMUxAoPY	
Comfort fitting wireless wrist keypad	https://youtu.be/c_lyTt0q2II	
Foldable touch pad for rapid fitting	https://youtu.be/qktiZJs5qeA	
Stretchable touch pad (wrist band) 202504	https://youtu.be/-grBm3WhQeM	

Easy (dis)assembly/refitting shape memory splint
(proof-of-concept)

<https://youtu.be/Zvk1fnh5-xc>



Easy take off/put on and refitting shape memory
splint

<https://youtu.be/3LuGA-xrRUo>



Easy (refit), put on/take off splint

<https://youtu.be/EWTNovyzHTs>



Comfort fitting neck splint

<https://youtu.be/Bnje8W6JHzE>



Demonstration of TPU slipper

<https://youtu.be/49uFNt5BwNE>



Rapid comfort fitting sock-shoes

<https://youtu.be/3tzDOk33xz4>

- As compared with

Skidders – ultraportable footwear for every adventure

https://www.kickstarter.com/projects/skidders/skidders-revolutionary-ultraportable-footwear-with?ref=project_tweet

Our shoes are able to maintain the shape of your foot once "programmed" to fit your size/shape (personalized), and stiffer (while still elastic) to provide better protection.



PCT has been filed.

Shape memory comfort fitting sock-shoes 20160604 <https://youtu.be/aoHrZvwotRU>



Comparison of normal socks and shape memory sock-shoes <https://youtu.be/s2ZYsC9qjKg>



Shape memory sock shoes 20160705E <https://youtu.be/tWsMFJ3sc3o>



Shape memory sock-shoes 20160815 A
- Surface finishing improved <https://youtu.be/mBe3bKUKUBY>



Testing 3D print pen sketched shape memory shoes <https://youtu.be/CEcYg53IE28>



Shape memory sock shoes
- Thin MG version <https://youtu.be/eVEWdwbAvGM>

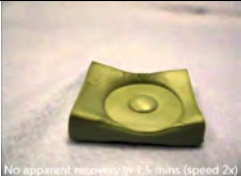


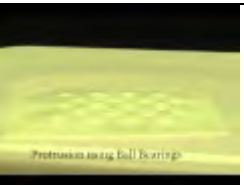
Shape memory sock shoes - Thick MG version	https://youtu.be/n4bmc6VC9bc	
Shape memory sock-shoes V20170328A - How to prepare your own sock-shoes in a couple of minutes?	https://youtu.be/NzK_jcKZWYY	
Shape memory sock-shoes: 1st test	https://youtu.be/CFIffRAphLI	
Self-fitting shoes: field test (2017/07/09)	https://youtu.be/iRkNtXQkc8	
Sock shoes 20170716 testing - tested in gym	https://youtu.be/pBY7XCCS4Zs	
Sock-shoes (indoor/outdoor tests) 20170716	https://youtu.be/yXZJe_0Ntso	

Testing of shape memory shoes 20170823	https://youtu.be/ZkO08wTEGok	
Comparison of normal socks and personalized sock shoes Refer to, e.g., - https://youtu.be/mBe3bKUKUBY - https://youtu.be/tWsMFJ3sc3o for the process of personalization.	https://youtu.be/p6Ufm1hZf0U	 Normal five-finger socks Personalized sock-shoes
Testing of 5-finger sock-shoes	https://youtu.be/Xb0sqD7Q7Ck	
1-4-all sock-shoes (V20171105.1) - No size, no right/left. Comfort fitting whenever wanted again and again.	https://youtu.be/aH_HfwXYTx0	 Testing of 1-4-all sock-shoes SMT@July 2017
Testing of two versions of shape memory sock-shoes	https://youtu.be/SxruPrVboSc	
Shape memory shoes V.20180726 - Testing of fitting using a shoe-last	https://youtu.be/5JMplPMitnY	 Shape memory shoes for comfort fitting SMT@July 2018

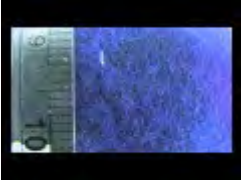
DIY shape memory shoes - Step by step to (DIY) fabricate shape memory shoes	https://youtu.be/twzOgr_CLOs	
Shape memory sock shoes 20210921	https://youtu.be/8jHJnIFxkh4	
Shape memory sock shoes (202203)	https://youtu.be/7uoR3ySqIos	
Shape memory shoes: material testing (preliminary)	https://youtu.be/v4pVN2q2zW8	
Shape memory shoes: material testing	https://youtu.be/dEkMbZkDNmg	
Molded shape memory shoe (half) 20220117	https://youtu.be/b-z9_YwairU	
Molded shape memory shoe 20220125	https://youtu.be/rzHfMEf-0hM	
Shape memory shoe (形状记忆鞋) 20220308	https://youtu.be/LB0-st3N8Io	

1st piece (bottom half) for testing: part of shape memory shoes	https://youtu.be/8xAlDJEFLy8	
Shape memory-shear thickening sole - Shear-thickening hydrogel version	https://youtu.be/URwpydV6HX4	
Testing of shear-thickening/shape-memory sole	https://youtu.be/mW7cZyM5s5o	
Rapid personalized hallux valgus correction socks - 03 Nov 2016	https://youtu.be/SsLNLeaBVzg	
Body-temperature remodelable soft elastic shape memory hybrid	https://youtu.be/xrd_av3a6xY	
Shape memory protection board	https://youtu.be/KmORomU_PY4	
Shape memory hand ring	https://youtu.be/MNSBVUy6C00	

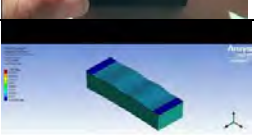
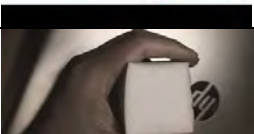
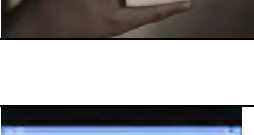
Heat shrink (foam) tube	https://youtu.be/JpYkLKCgk7s	
Heat shrink (foam) tube for comfort handle - Proof of concept	https://youtu.be/ZdVMHzhIIWk	
Testing of slow recovery foam - Recovery speed is much lower than ordinary slow recovery foam (memory foam). The shape deformed at high temperatures can be maintained for a long period of time.	https://youtu.be/fPEYlrgHoSk	
Control recovery time of slow recovery foams	https://youtu.be/iaUS6WOXKwY	
To modify elastic textile to become shape memory textile (I)	https://youtu.be/56-WKtNkHSk	
To modify elastic textile into shape memory textile (II)	https://youtu.be/xPGcSBd9qUw	
Testing of Jersey with/without modification	https://youtu.be/37r5Dfj5iEo	

Flatten butterfly wing	http://youtu.be/wkD_JS7Hxgo	
Testing of two insole materials	https://youtu.be/mxobF1p7iZg	
SMP tag	http://www.youtube.com/watch?v=0G5DeeQXQ0s Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Electrically conductive SMP to active a toy	http://www.youtube.com/watch?v=oVhOEM6RLIQ	
Shape memory effect in a plastic toy	https://youtu.be/Zsji_r6vYbU	
Formation of protrusion array atop SMP	http://www.youtube.com/watch?v=Kdhd8L1peW4 Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

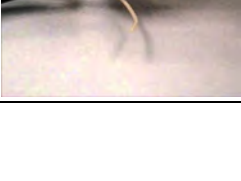
Machining of PS SMP plate - Material: PS shape memory polymer (from CRG)	http://youtu.be/Mrdflqqeo64	
Recovery of indents upon heating - Material: PS (from CRG)	http://youtu.be/KDwsP5bAOSY	
Indentation (PS SMP, simulation) A	http://youtu.be/o7KU4i9_oEY	
Indentation (PS SMP, simulation) B	http://youtu.be/jztdeKr_SoQ	
Indentation (PS SMP, simulation) C	http://youtu.be/3uA_CIgnRGA	
Micro SMP spring (coil 500 um; wire 70 um)	http://www.youtube.com/watch?v=vgHUDP8XwAI Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	

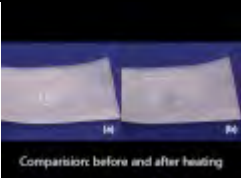
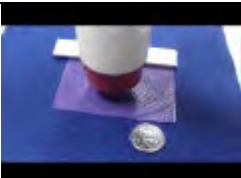
PU fiber (MM5520) in room temperature ethanol	http://www.youtube.com/watch?v=db_VpiCIZrE	
PU spring (MM5520) in room temperature ethanol	http://www.youtube.com/watch?v=6Ia9xnNW4nk	
PU spring (MM5520) in ethanol (self-twisting/untwisting)	http://www.youtube.com/watch?v=WYbq2XIqy9M	
Pre-stretched PU spring (MM5520) in room temperature ethanol	http://www.youtube.com/watch?v=jxmIj4BhfTY	
Shrinking of pre-stretched TPU in acetone atmosphere - Thermal plastic TPU265A (T_m about 60 Deg C), stretched at room temperature	http://youtu.be/AxYKWYhrFVQ	
Bending of pre stretched PCL in acetone atmosphere	http://youtu.be/QKJVKVANIZQ	

Instability in FDM printing (PLA from Esun)	https://youtu.be/UhMTTyGv2c8	
Buckling of pre-stretched PMMA in hot silicone oil	http://www.youtube.com/watch?v=KymDucw0EHU Reference: Zhao Y, Wang CC, Huang WM, Purnawali H, Buckling of poly(methyl methacrylate) in stimulus-responsive shape recovery, <i>Applied Physics Letters</i> , accepted	
Buckling of straight wires embedded in soft elastic matrix	https://youtu.be/IXy538SJRfs	
Buckling of embedded threads in soft matrix	https://youtu.be/a40TfA39_uo	
Wavelength controlled buckling of embedded strips	https://youtu.be/Lz4_cQjDI70	
Buckling atop soft surface	https://youtu.be/TYchZwnzUjg	
Example for Hole experiment with joint waves	https://youtu.be/0qviJHDtr34	
Example of Hole experiment no joint waves	https://youtu.be/hyF-_OK3h68	

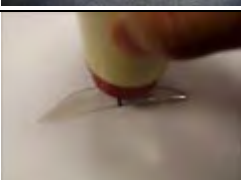
Modified via laser engraving (buckling of elastic strip atop soft substrate)	https://youtu.be/At92RuziQ3w	
Preshaped strip experiment 2.75 mm wavelength	https://youtu.be/dIYUWPQwk-4	
Preshaped strip experiment 2.25 mm wavelength	https://youtu.be/EPI4sJKxpeg	
Buckling of PI strip (LIG modified)	https://youtu.be/KsPi1SOR2aA	
Bilayer strip (substrate shrinkage induced deformation)	https://youtu.be/_Sxt07OY9os	
Quasi-plastic indentation atop pre-compressed melamine foam	https://youtu.be/U_q568Ap1dw	
Joule heating PU SMP (temperature distribution) A	http://youtu.be/-YdpPVVRYMI	

Joule heating PU SMP (temperature distribution) B	http://www.youtube.com/watch?v=U1OsIVkH7HM	
Joule heating PU SMP (temperature distribution) C	http://youtu.be/WK6qnlyqW6Q	
Joule heating PU SMP (temperature distribution) D	http://youtu.be/iDLOG4Twj_A	
Joule heating PU SMP (temperature distribution) E	http://www.youtube.com/watch?v=5P39v6ZnKws	
Shape recovery of PU SMP/clay composite A PU SMP (MM3520) 5wt% non-treated clay atop 80 Deg C hotplate	http://youtu.be/r5nzTP_5QC8	
Shape recovery of PU SMP/clay composite B PU SMP (MM3520) 10wt% non-treated clay atop 80 Deg C hotplate	http://youtu.be/NkH3DH3hOxA	

From 3D printing to 4D	http://youtu.be/7hJ-VUod1PM	
Heating-responsive shape memory effect in PLA: from 3D printing to 4D	http://youtu.be/fXSmsriL_iQ	
Testing of the shape memory effect in 1.5 mm PLA filament for 3D printing	http://youtu.be/0M4hKY4VFfw	
The shape memory effect in PLA filament for 3D printing (small strain)	http://youtu.be/8FiVt4vvqCY	
Years old PLA filament - Ductile/brittle and shape memory effect	https://youtu.be/Gc4ecJAVKeE	
Years old Flx filament from RoHS - Ductile/brittle and shape memory effect	https://youtu.be/zMopvGtQCOK	
The shape memory effect in flexible filament from ESUN - 1.75 mm for 3D printing, ESUN	http://youtu.be/W6YKfklzyEU	

Heating-responsive shape memory effect in PVA filament (for 3D printing)	http://youtu.be/AfAkdJ_7nRo	
PVA filament (for 3D printing) in water	https://youtu.be/sGSMEori6ow	
PLA card 01	http://youtu.be/I_VH4RwSLXA	
PLA card 02	http://youtu.be/xs7PdFhreYg	
PLA card 03	http://youtu.be/VdZOilxogTA	
Verification of concept of 3D printed magic card	http://youtu.be/q7f2_Jx3soE	

Makerbot Replicator 2 printed PLA card	http://youtu.be/FIQIhyLAR6c	
3D printed personalized card, which reveals the actual image only upon heating	http://youtu.be/VCMG7f_DJWg 3D printed personalized card. Its actual image only appears when heated by a hair dryer or hot water. It may be used as a gift card to bring a big surprise (secret message, signature or image) .	
Shape memory effect in FDM printed PLA flakes	https://youtu.be/RLa9G7U75T0	
4D card	http://youtu.be/3Pp2jYpiFBo	
Unfolding 3D printed Apple-Jobs	http://youtu.be/TvDotEXFBiM	
3D/4D printed NTU	http://youtu.be/UCcnRvk6h-Y	
SME in 3D printed PLA cat	https://youtu.be/a7NeKADfa6Y	

Reshaping via shape memory effect (FDM printed)	https://youtu.be/0Kc61kT8xRY	
Shape memory effect in PLGA	http://youtu.be/pLUpTBE8Dj0	
Testing of the shape memory effect in PLGA (II)	http://youtu.be/bo6ebdxzrBo	
SME in TPU	http://youtu.be/NAVftYAtjLY	
The SME in heat treated thermoplastic polyurethane - Much less sticky at high temperatures, able to be programmed at high temperatures and good SME	http://youtu.be/5MihzQWIExo	
Shape memory effect and change of transparency in thermoplastic polyurethane	http://youtu.be/_ZkVj1Ys6-Q	

Soft shape memory polymer: able to catch finger print

<http://youtu.be/nkdw60aVd18>



Shape recovery in TPU 262A

- Twisted when it was still transparent, held for crystallization

<https://youtu.be/4LT7qkuyOzA>



SME in a thermoplastic PU 20160421

- Sample was prepared by hot compression

<https://youtu.be/saH3x931zE4>



The SME in coated TPU/PU mixture

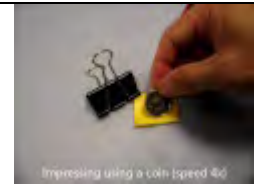
- Finger print caught and then removed upon heating again

<http://youtu.be/pKg-iZm73Pw>



SME in heat shrink polymer

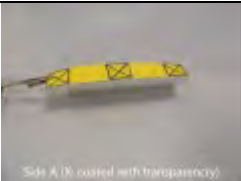
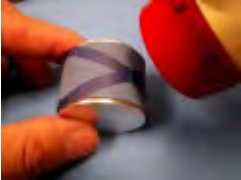
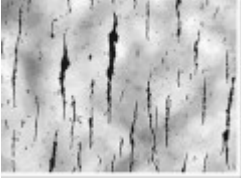
<https://youtu.be/LlFU4kyTpgM>



Macro/micro SME in heat shrink polymer

<https://youtu.be/hWVTA2hSTww>



Heat assisted self-folding using heat shrink polymer	https://youtu.be/hekK2OPh9MM	 Sides A & B coated with transparency.
Gravure printing using heat shrink tube	https://youtu.be/IlGrbwnoDcA	
Heat to open	https://youtu.be/RBFCwydZoQs	
Heat to open (2D)	https://youtu.be/LHEpx2gE868	
Heat to bend due to strain mismatch	https://youtu.be/kZ9kxSUzUcc	 Forming a "button" using "buckling/bending" phenomenon (demonstration of strain mismatch)
Formation of Fe ₃ O ₄ magnetic chains in polyurethane shape memory polymer	http://youtu.be/Nr3uyUTT2a8 Reference(s): Huang, W.M., Yang, B. and Fu, Y.Q., <i>Polyurethane shape memory polymers</i> , Taylor & Francis/CRC Press, 2011 Lan, X., Huang, W.M., Leng, J.S., Liu, N., Phee, S.J. and Yuan, Q., Elektrisch leitfähige Formgedächtnispolymere (Electrically conductive shape-memory polymers), GAK Gummi	

Fasern Kunststoffe (in German), Vol.61, No. 12, 2008, pp784-789

Lan, X., Huang, W.M., Leng, J.S., Liu, N., Phee, S.J. and Yuan, Q., Electric conductive shape-memory polymer with anisotropic electro-thermo-mechanical properties, **RFP Rubber Fibers Plastics**, Vol. 4, 2009, pp 84-88

Switching of Fe₃O₄ magnetic chains in polyurethane shape memory polymer at 200°C

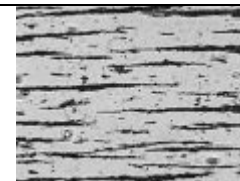
<http://youtu.be/604NV2BTwCc>

Reference(s):

Huang, W.M., Yang, B. and Fu, Y.Q., *Polyurethane shape memory polymers*, Taylor & Francis/CRC Press, 2011

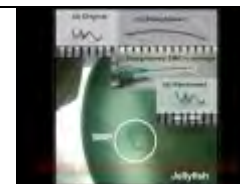
Lan, X., Huang, W.M., Leng, J.S., Liu, N., Phee, S.J. and Yuan, Q., Elektrisch leitfähige Formgedächtnispolymere (Electrically conductive shape-memory polymers), **GAK Gummi Fasern Kunststoffe** (in German), Vol.61, No. 12, 2008, pp784-789

Lan, X., Huang, W.M., Leng, J.S., Liu, N., Phee, S.J. and Yuan, Q., Electric conductive shape-memory polymer with anisotropic electro-thermo-mechanical properties, **RFP Rubber Fibers Plastics**, Vol. 4, 2009, pp 84-88



An introduction to chemo-responsive shape memory/change effect in polymeric materials

<http://youtu.be/Xmwt6p11Lf0>

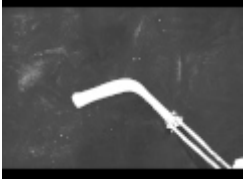


Reference(s):

Huang, W.M., Yang, B. and Fu, Y.Q., *Polyurethane shape memory polymers*, Taylor & Francis/CRC Press, 2011

Huang et al Thermo-moisture responsive polyurethane shape-memory polymer and composites: a review, *Journal of Materials Chemistry*, Vol. 20, 2010, pp3367-3381

Shape memory hybrids

Shape memory effect in silicone/wax hybrid	http://youtu.be/5hWwwcCgXRg Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Shape memory effect in silicone/sodium acetate hybrid	http://youtu.be/2oKWGxjtaYU	
Shape memory effect in silicone/wax/melting glue hybrid	http://youtu.be/b2jTrBT1RJo	
SME in silicone/glucose hybrid A	http://www.youtube.com/watch?v=napRAaupNgI	
SME in silicone/rosin hybrid A	http://www.youtube.com/watch?v=_3yVgqSOTTw	
Healing of scratch produced by blade atop TPU - Heat-assisted healing based on the shape memory effect	https://youtu.be/pWLZn6WAyAQ	

in TPU

Rubber-like SMH with repeated instant self-healing function A1

<http://www.youtube.com/watch?v=PBthRXKJeUM>

Reference(s):

Huang et al, Shape memory materials, *Materials Today*, Vol. 13, 2010, pp54-61
Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Rubber-like SMH with repeated instant self-healing function A2

http://www.youtube.com/watch?v=kKBDPUtN_Sg

Reference(s):

Huang et al, Shape memory materials, *Materials Today*, Vol. 13, 2010, pp54-61
Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640

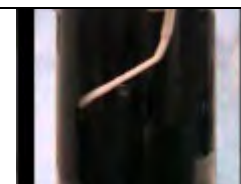


Rubber-like SMH with repeated instant self-healing function A3

<http://www.youtube.com/watch?v=WRebpWvpk9w>

Reference(s):

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Rubber-like SMH with repeated instant self-healing function A4a

<http://www.youtube.com/watch?v=N8us-7BEASE>

Reference(s):

[Programmed sample (in V-shape) under cyclic loading at room temperature]

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Rubber-like SMH with repeated instant self-healing function A4b

<http://www.youtube.com/watch?v=BkgcwFKsQPI>

Reference(s):

[Original straight sample under cyclic loading at room temperature.]

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Rubber-like SMH A	http://www.youtube.com/watch?v=nWEtddspd9o	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
It is show-time: Magic I	http://www.youtube.com/watch?v=O_ndngzQIRg	
	Samples prepared by: CHIA JIUN WEI as a part of his URECA 2010 Magician: TAN KHUN LING as a part of his URECA 2011	
It is show-time: Magic II	http://youtu.be/E0KXMGtaqTU	
It is show-time: Magic III	http://youtu.be/UWahJHC1Nic	
Mind reader	http://youtu.be/qn_0IMnm-sA	
	Magician: TAN KHUN LING as a part of his URECA 2011	
Reconfigurable elastic mug	http://youtu.be/w6rI_lpsQXo	
The distorted elastic mug (made of silicone and MG) is able to return its original shape upon heating by hot water.		
- URECA 2013-2014 project by		

TAN PHEI CHIEH

Room temperature programmable shape memory rubber

https://youtu.be/G_nBiL-Y4_A



Elastic shape memory rubber: able to catch finger print at body temperature

- Shore hardness 30A; during impression at body temperature about 10A

<https://youtu.be/X5T03ZXCFpU>



Shape memory rubber

- Comparison of two versions.

<https://youtu.be/LfMhqktPJCY>



Body/room-temperature reconfigurable rubber

<https://youtu.be/K-eYB-c5S64>



Body temperature programmable soft shape memory polymer

<https://youtu.be/rVZVeqNdXpM>



Body temperature programmable elastic SMP: testing of elasticity at room temperature

<https://youtu.be/NYNT3mFGti4>

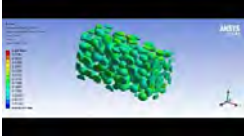
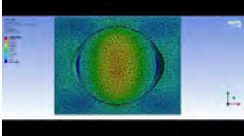
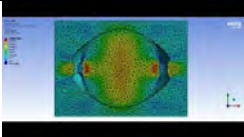


Highly elastic body-temperature programmable silicone shape memory hybrids

<https://youtu.be/aE4rn-wnApA>



Testing elasticity of body temperature programming shape memory hybrids (two types)	https://youtu.be/lrUnSKgHykU	
Body-temperature programmable shape memory/stretchable electronic device for comfort fitting	https://youtu.be/Jv4GDVjZl8w	
Stretchable, body-temperature programmable shape memory electronic device (proof-of-concept)	https://youtu.be/mSQtJZjwmTc	
Extra-soft shape memory sponge programmable at body/room temperature	https://youtu.be/YVb5ws3h2Xk	
Body/room temperature programmable highly elastic/soft shape memory foam	https://youtu.be/TCqbWp8o-3w	
Body-temperature programmable soft shape memory sponge	https://youtu.be/s11q_03IALk	
Body/room temperature programmable rubber-band-like thermoplastic shape memory polymer	https://youtu.be/he9fPXeUWns	
- Thermoplastic (good for 3D printing), rubber-band-like at room temperature, programmable at body/room temperature in 3-5 min, 100% shape fixity ratio and		

shape recovery ratio		
FEM simulation of body-temperature programmable elastic shape memory hybrids: in uniaxial tension	https://youtu.be/FPBIRk2K8pk	
Formation of eyeball in stretching of shape memory hybrid: FEM simulation	https://youtu.be/3HF6N6bFrCs	
Inclusion in soft elastic matrix (Mullins effect)	https://youtu.be/PcAYisLcLBM	
Elasticity and shape memory effect in UHU glue (testing, Version I)	https://youtu.be/VcFDMmzRjK4	
Body-temperature programmable elastic thermoplastic shape memory polymer	https://youtu.be/800tumghX20	
Body-temperature programmable thermoplastic elastic shape memory polymer: shape memory effect	https://youtu.be/aRjTgUypcvo	
Transparent, elastic, body temperature programmable, thermoplastic shape memory polymers	https://youtu.be/Xb8uw5s4so4	

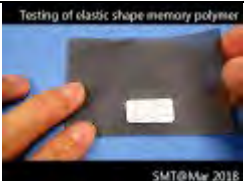
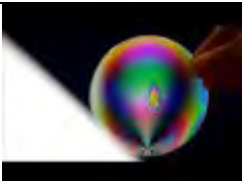
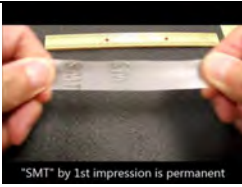
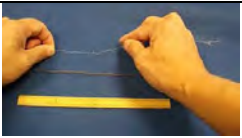
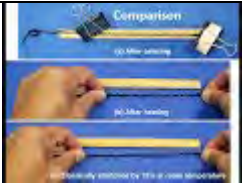
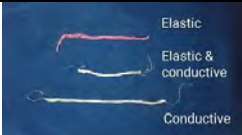
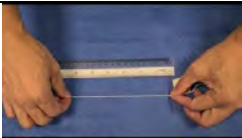
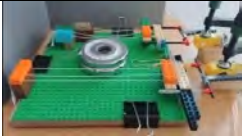
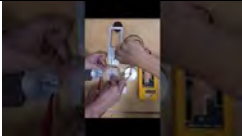
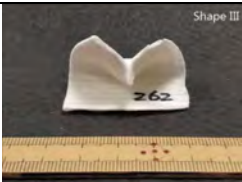
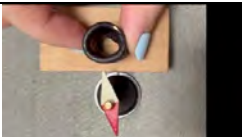
Body temperature programmable thermoplastic elastic SMH	https://youtu.be/yjyG70NSHW0	
Body-temperature programmable thermoplastic elastic shape memory polymers	https://youtu.be/HnYh2B3sVE8	
Rubber-band like transparent shape memory polymer -Always as elastic as rubber-band, fully transparent, with heat-responsive shape memory effect	https://youtu.be/kC5tuPWBU8o	
Thermo-plastic shape memory rubber	https://youtu.be/Uf5IgJMr0R8	
Testing of rubber-like shape memory membrane (programming and recovery)	https://youtu.be/fsaKIG0pg3g	
Photoelastic test of rubber-like shape memory membrane	https://youtu.be/4pCCpVmOM3I	

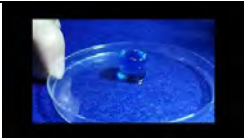
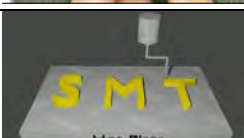
Photo-elasticity test: elastic TPU upon heating	https://youtu.be/qpJoESapk9U	
Photo elasticity: local heating of plastic petri dish and PP box (cover) - Using a lighter	https://youtu.be/Ecvm2GrBJ8g	
Chemo-responsive shape memory phenomenon in rubber-like shape memory membrane - Activated by acetone and ethanol	https://youtu.be/lXPvXSyvFCk	
Acetone induced shape recovery in a TPU film - Comparison of with/without pre-stretching	https://youtu.be/AG-4T6HWwKQ	
Wet TPU film by acetone droplet	https://youtu.be/8Ff7lOvL0Fw	
Always rubber band like elastic shape memory polymer - Highly elastic at both high and low temperatures, thermoplastic	https://youtu.be/QOHKaP6wtqM	

Shape memory rubber: setup of the permanent and temporary impression	https://youtu.be/YSSLd_vtsYs	
Hot pressed rubber-like shape memory polymer - Polarized video for comparison of hot compressing	https://youtu.be/fka_BBt5Lt0	
Testing of the shape memory effect in a rubber-like shape memory polymer	https://youtu.be/nvceAJ1z610	
Stretching/heating a SBS TPR strip (photo-elasticity)	https://youtu.be/VSNfc3wJDgw	
Comparison of two types of spandex: elasticity and shape recovery	https://youtu.be/y6Lu-HkmK_c	
Wearable electrical device based on flexible shape memory polymeric material	https://youtu.be/DscqyMtfzFY	
Resistance measurement (combined) Stretchable conductive bundle/fabric	https://youtu.be/yeeOCr94Nnk	

Elastic electrical bundle - Without changing in resistance upon reversible stretching	https://youtu.be/s0qFSpiVaCw	
Stretchable/conductive wrist ring: comparison	https://youtu.be/v4515nTH01Q	
Stretchability of elastic, elastic/conductive, and conductive threads	https://youtu.be/ZZ9iLzyhRWg	
Significant drop in resistance upon stretching of highly elastic conductive bundle	https://youtu.be/-SaSwtfhYI4	
Stretchable conductive thread (20210908)	https://youtu.be/BKsY15L3Do4	
Cyclic loading of stretchable conductive bundles (6 samples setup)	https://youtu.be/2KoHhy_6jTc	
Flexible touch pad 20210619: Made of commercial threads and technologies	https://youtu.be/VkY6P0mZnPg	
Stretchable conductive thread: pre-test	https://youtu.be/JkD87A1DyOs	

Stretchable touch pad	https://youtu.be/5VsSHAkjYmI	
Stretchable capacitive Touchpad	https://youtu.be/ra2P91MeJ9E	
Stretchable capacity touchpad V-II	https://youtu.be/HuwhZIDOctA	
From 2D to 3D via heat induced folding using vitrimer PU - Self-folding via the shape memory effect in vitrimer polymer	https://youtu.be/FXgZ0XFrUd0	
2D to 3D morphing with vitrimer PU	https://youtu.be/0hkctv5TRs4	
Easy reshape with vitrimer composites	https://youtu.be/bkJyMErA1oY	
Lord of the rings (trilogy): rings with single magnetic pole on the outer surface	https://youtu.be/TsfZzLySrPM	

Semi-suspended	https://youtu.be/4uAJgwVka_o	
Shape memory magnet with re-programmable magnetic field	https://youtu.be/OD5ONnkYTvU	
Cooling/water-responsive SMH A [Melting upon cooling]	http://www.youtube.com/watch?v=VMeZAPzMXyw Reference: Wang CC, Huang WM, Ding Z, Zhao Y, Purnawali H, Cooling-/water-responsive shape memory hybrids, <i>Composites Science and Technology</i> , in press	
Cooling/water-responsive SMH B [Programming]	http://www.youtube.com/watch?v=09t_vFg_LTE Reference: Wang CC, Huang WM, Ding Z, Zhao Y, Purnawali H, Cooling-/water-responsive shape memory hybrids, <i>Composites Science and Technology</i> , in press	
Cooling/water-responsive SMH C [Recovery in 0°C water]	http://www.youtube.com/watch?v=y_1ZzmcgHj8 Reference: Wang CC, Huang WM, Ding Z, Zhao Y, Purnawali H, Cooling-/water-responsive shape memory hybrids, <i>Composites Science and Technology</i> , in press	
Cooling/water-responsive SMH D [Recovery in 20°C water]	http://www.youtube.com/watch?v=yZj5BrXZpoM Reference: Wang CC, Huang WM, Ding Z, Zhao Y, Purnawali H, Cooling-/water-responsive shape memory hybrids, <i>Composites Science and Technology</i> , in press	

Cooling-responsive shape memory hydrogel	https://youtu.be/S8ePH8gYl7k	
Cooling-responsive shape memory hydrogel cross-linked in solid state	https://youtu.be/o_XdO-PJrXY	
Cooling responsive shape memory hydrogels: shape recovery	https://youtu.be/I1KJ9PD4nuU	
Testing of cooling-responsive shape memory hydrogel: shaking and sticky	https://youtu.be/L11cf9j0qnI	
Testing of cooling-responsive shape memory hydrogel: sticky	https://youtu.be/es2X-qUfhlo	
Cooling responsive shape memory hydrogel 20190511	https://youtu.be/2o6FyI1leUI	
Cooling-responsive shape memory hydrogel: elastic, not so sticky version	https://youtu.be/heJBsfkbLyg	
Animation of 3D printing thermal gel	https://youtu.be/cr5RQ_3gLP4	

- Printing via FDM and then

UV curing.

Electro-activated shape memory
hybrid structure

<https://youtu.be/cV0u0XyE0FU>



Pure electro-active shape memory
hybrids: from concept to
demonstration

<https://youtu.be/FXvklkFIOWc>



Real electro-active shape memory
hybrid (still improving)

https://youtu.be/rxOyIL_OTCw



Real electro-activated SMH
(prototype 2)

<https://youtu.be/7IJGq77ejhA>



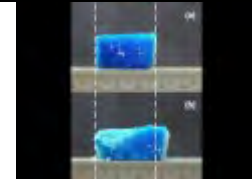
Tapping induced SME

<http://youtu.be/DbVoQSswyiA>



Pressure responsive SMH (impact)

http://youtu.be/T_gnocq8rzE



Water-responsive SMH A (polymer sponge/cupric sulphate pentahydrate)	http://youtu.be/PBgdT-6E7Z0 Reference(s): Fan, K., Huang, W.M., Wang, C.C., Ding, Z., Zhao, Y., Purnawali, H., Liew, K.C. and Zheng, L.X., Water-responsive shape memory hybrid: design concept and demonstration, <i>eXPRESS Polymer Letters</i> , Vol. 5, No. 5, 2011, pp409-416 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
How to DIY your own shape memory foam?	http://youtu.be/OxdDpNdtwzo	
Transformer made of sponge/wax -2013/14 FYP	http://youtu.be/jR4WBJkwYEQ	
Shape memory effect in modified elastic sponge	https://youtu.be/1Gi1emU-wN0	
Memory foam, hand impression	http://youtu.be/dpUToykm0XI	
Comparison of different slow recovery (memory) foam	https://youtu.be/hlEGVNftnLA	

Heating assisted recovery in
"elastic" sponge

- clamped for two days

<http://youtu.be/cLCD4ekwaHo>



Shape recovery of elastic sponge
with/without heating

- clamped for one month

<http://youtu.be/n8EE7drMaic>



DIY elastic shape memory sponge

<https://youtu.be/YmXB8eePrBY>



Heating assisted recovery in
"elastic" sponge

- clamped for two months

http://youtu.be/m2ZLwzK2E_E



The shape memory effect in elastic
sponge

- Water/heating-responsive?

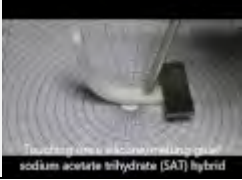
<http://youtu.be/BTLoVOwmucY>



SME in EVA insole

<http://youtu.be/Fw4QIkC0f4I>



Comparison of elastic sponge, memory foam and shape memory foam	http://youtu.be/KbV6iwyKFC4	
SME in styrofoam	http://youtu.be/YwJnAxe_4BY	
Water-responsive SMH B (silicone/ sodium acetate trihydrate) (right: in air; left: in room temperature water)	Reference(s): Fan, K., Huang, W.M., Wang, C.C., Ding, Z., Zhao, Y., Purnawali, H., Liew, K.C. and Zheng, L.X., Water-responsive shape memory hybrid: design concept and demonstration, <i>eXPRESS Polymer Letters</i>, Vol. 5, No. 5, 2011, pp409-416 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	
Electrically conductive SMH (joule heating, 6%CF+20%wax56+74%silicone)	Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i>, 33, 2012, 577-640	
Multiple-stimuli-responsive silicone-sodium acetate trihydrate hybrid	http://youtu.be/aJqQdKsdSUM	
An introduction to mechano-responsive shape memory hybrid	http://youtu.be/2vZr21jx7j4	

An introduction to cooling-responsive shape memory hybrid (SMH)	http://youtu.be/4dFc1EEQuI	
An introduction to shape memory hybrid (SMH): a technique to design your own shape memory materials	http://youtu.be/HvIMcYnhrMQ	

Medical applications of shape memory materials

Self-untying SMP suture upon heating	http://www.youtube.com/watch?v=2XEBdzdRN70	
Self-untying SMP suture upon heating (fast)	http://youtu.be/_3KBjG1EMPs Reference: <u>Huang WM</u> , Song CL, Fu YQ, Wang CC, Zhao Y, Purnawali H, Lu HB, Tang C, Ding Z. Zhang JL, Shaping tissue with shape memory materials, <i>Advanced Drug Delivery Reviews</i> , in press	
Self-untying SMP suture upon heating in hot water	http://youtu.be/bw7oklXN2zk	

Self-tightening (PU wire) knot upon immersing into water	http://youtu.be/jISPzrxZs6w Reference: Huang, W.M., Yang, B. and Fu, Y.Q., <i>Polyurethane shape memory polymers</i> , Taylor & Francis/CRC Press, 2011 <u>Huang WM</u> , Song CL, Fu YQ, Wang CC, Zhao Y, Purnawali H, Lu HB, Tang C, Ding Z. Zhang JL, Shaping tissue with shape memory materials, <i>Advanced Drug Delivery Reviews</i> , in press	
Self-tightening SMP suture upon heating	http://youtu.be/Uh6e7fFDB44 References: Huang, W.M., Yang, B. and Fu, Y.Q., <i>Polyurethane shape memory polymers</i> , Taylor & Francis/CRC Press, 2011 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
PLA spiral spring for sutureless anastomosis	http://youtu.be/t_UoWalEYjw Reference: <u>Huang WM</u> , Song CL, Fu YQ, Wang CC, Zhao Y, Purnawali H, Lu HB, Tang C, Ding Z. Zhang JL, Shaping tissue with shape memory materials, <i>Advanced Drug Delivery Reviews</i> , in press	
Self-tightening PLA staple	http://youtu.be/Y5gnwpdt-3g Reference: <u>Huang WM</u> , Song CL, Fu YQ, Wang CC, Zhao Y, Purnawali H, Lu HB, Tang C, Ding Z. Zhang JL, Shaping tissue with shape memory materials, <i>Advanced Drug Delivery Reviews</i> , in press	
Proof of concept of self-tightening staple: 1 preparation (2012/2013 FYP)	http://youtu.be/k08lj2FwW9E	

Proof of concept of self-tightening staple: 2 the shape memory effect

(2012/2013 FYP)

<http://youtu.be/Bf3xrwQIOis>



Proof of concept of self-tightening staple: 3 penetration

(2012/2013 FYP)

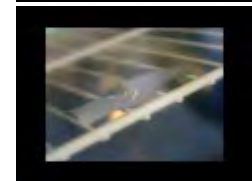
<http://youtu.be/jojO52kwyxE>



Proof of concept of self-tightening staple: 4 tightening

(2012/2013 FYP)

<http://youtu.be/OYHRLSHZoAI>



Retractable SMA spiral stent (two-way SME)

<http://youtu.be/u6IOmmcYLW4>

Reference:

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Retractable SMA stent (triple-SME)

<http://youtu.be/PmUcWMpw4HA>

Reference:

Huang WM, Song CL, Fu YQ, Wang CC, Zhao Y, Purnawali H, Lu HB, Tang C, Ding Z. Zhang JL, Shaping tissue with shape memory materials, *Advanced Drug Delivery Reviews*, in press



Retractable SMA/silicone composite stent

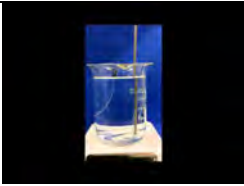
<http://youtu.be/66JJDy9XlqE>

Reference:

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Retractable SMH stent (silicone/ sodium acetate trihydrate) upon immersing into room temperature water	http://youtu.be/T4PkAK9i6uA Reference(s): Fan, K., Huang, W.M., Wang, C.C., Ding, Z., Zhao, Y., Purnawali, H., Liew, K.C. and Zheng, L.X., Water-responsive shape memory hybrid: design concept and demonstration, <i>eXPRESS Polymer Letters</i> , Vol. 5, No. 5, 2011, pp409-416 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Retractable elastic shape memory stent	http://youtu.be/hNvkuwr2Mdk	
Elastic shape memory polymeric stent with retraction function (2009 EID project)	http://youtu.be/0le2uQ6QPVM	
Injection of PU SMP spiral spring/wire into jellyfish	http://www.youtube.com/watch?feature=player_detailpage&v=U6lySw33pbM	
Water activated PEG sponge hybrid	http://youtu.be/ct7PNLB8u3U	
Wetting induced buckling in PEG hydrogels with different prestrains	http://youtu.be/heBKLaxUCWI	

Wetting induced buckling in PEG hydrogel (optimized)	http://youtu.be/Zyoe-63UCRE	
Wetting induced buckling in PLGA PEG composites with different prestrains	http://youtu.be/zjkEHnfn5HU	
Rapid occlusion of blood vessel (demonstration) - In two minutes. An A*STAR BEP project	http://youtu.be/5KqjOtJZEBI	
Rapid occlusion of blood vessel (in vitro, dual vessels)	http://youtu.be/UBD7TemjwcU	
Biodegradable shape memory embolization: Animal test April, 2015	http://youtu.be/24SPv34qo9E	
Water/body fluid activated biodegradable plug 23 Sep 2015	https://youtu.be/aaHFDaJy7pc	

Wetting induced buckling (real time exp. results) 201602 <https://youtu.be/tbyNFgeYmk8>

- Biodegradable polymer



Water induced buckling in pre-stretched PEG wire within a tube <https://youtu.be/6MQ0Th4128w>

PEG in constrained tube with flow system.

Diameter

Before stretching: 2.45 mm

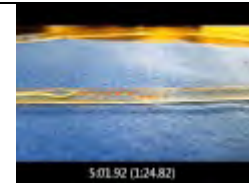
After stretching 600% : 0.87 mm

Length: 50 mm

Flow Rate: 120 ml/min

Flow media : Deionized water at 37 °C

Tube Diameter: 4 mm



Comparison of water induced buckling in pre-stretched PEG wire <https://youtu.be/XG9o57tPlhg>

(free-standing/within confined space)

Video speed 8x



Wetting in water and drying in air of PEG/PLGA <https://youtu.be/xKIIDi9GXrY>



滴管封堵试验 <https://youtu.be/XDgXZvX8RvI>



Testing of prestretched PEG/PLGA composite wires in water (I) <https://youtu.be/e69I45cI2qQ>



Testing of prestretched PEG/PLGA composite wires in water (II) <https://youtu.be/T3-o-i-YtbU>



Shape memory material morphing wings

SMA morphing wing 01 http://www.youtube.com/watch?v=D_nOtAhX_1Y

Reference(s):

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



SMA morphing wing 02 <http://www.youtube.com/watch?v=fN69J3pp3ak>

Reference(s):

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640

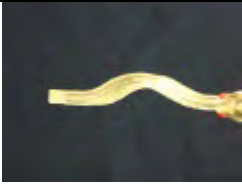


SMA morphing wing 03 <http://www.youtube.com/watch?v=qajk6df7dGk>

Reference(s):

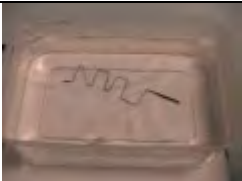
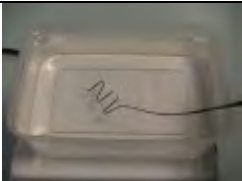
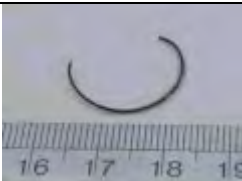
Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



SMA morphing wing 07	http://www.youtube.com/watch?v=gxEc8SqjdEg	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA morphing wing 04	http://www.youtube.com/watch?v=C44ZLRiH-t8	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA morphing wing 09	http://www.youtube.com/watch?v=d54o7PIamUk	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA morphing wing 05	http://www.youtube.com/watch?v=v2Ucnak1lf8	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA morphing wing 06	http://www.youtube.com/watch?v=ohdjKISU0c4	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA morphing wing 08	http://www.youtube.com/watch?v=Cz3CyG_dK0	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

SMA morphing wing 10	http://www.youtube.com/watch?v=APdPDHTI-F0	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMA morphing wing 11 (1 st version)	http://youtu.be/omuurzZTdGo	
SMA morphing wing 12 (2 nd version)	http://youtu.be/sva4KxFCze4	
SMP morphing wing 01	http://www.youtube.com/watch?v=yhHI_i_DgY8	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
SMP morphing wing 02	http://www.youtube.com/watch?v=Hw02mEsTtsE	
	Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

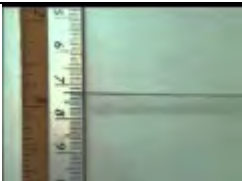
One-way/two-way shape memory effect

One-way shape memory effect in shape memory alloy (NTU_quick one)	http://youtu.be/EszaN7T9Y8A	
One-way shape memory effect in shape memory alloy (NTU_slow one)	http://youtu.be/Qy0aQYBLfx0	
Two-way shape memory effect in a NiTi wire	http://youtu.be/26-gT5-Rnx8 Reference(s): Huang, W.M., Goh, H.B. and Li, C., Effects of reheat treatment conditions in training of two-way shape memory, <i>Journal of Materials Science Letters</i> , Vol. 21, No. 13, 2002, pp991-993 Huang, W. and Goh, H. B., On the long term stability of two-way shape memory alloy trained by reheat treatment, <i>Journal of Materials Science letters</i> , Vol. 20, 2001, pp1795-1797 Huang, W. and Toh, W., Training two-way shape memory alloy by reheat treatment, <i>Journal of Materials Science Letters (UK)</i> , Vol.19, No.17, 2000, pp1549-1550	
Material two-way shape memory effect (twisting)	http://youtu.be/Z81pigcsPul Reference: Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Material two-way shape memory spring - Contraction upon heating; expansion upon heating (atop a hot plate)	http://youtu.be/FSMWsQHgPMg	

One-way/material two-way shape memory effect in shape memory alloy	http://youtu.be/QMXSe5HvW-0	
Testing of material two-way SME in Nitinol - As received cold drawn Nitinol wire, heat treated one time.	https://youtu.be/o-bwM5dpKdU	
Mechanical two-way shape memory effect in shape memory hybrid (I) (silicone/sodium acetate trihydrate)	http://www.youtube.com/watch?v=4fZHUOxXs0A&feature=youtu.be	
Mechanical two-way shape memory effect in shape memory hybrid (II) (silicone/wax) Reference: Huang et al, Shape memory materials, <i>Materials Today</i> , Vol. 13, 2010, pp54-61	http://youtu.be/MUrybfNq428	
Shape memory alloy wig (Change shape according to your current mood, if you want).	http://youtu.be/dBbgiB9cIGU	
Shape memory alloy "star" (one-way and then material two-way shape memory effect)	http://youtu.be/eRq-26PbU0I	

Material two-way NiTi SMA micro gripper	http://youtu.be/E2lgXS60iSc	
- Joule heating, laser cutting from SMA sheet	Reference: Huang, W.M., Gao, X.Y., Loo, B.K., He, L.M. and Ngoi, B.K.A., Micro gripper using two-way shape memory alloy thin sheet, <i>The International Conference on Superelastic Technologies and Shape Memory Materials (SMST-SMM 2001)</i> , 2-6 September, 2001, Kunming, China, pp43	
Micro-gripper using material two-way shape memory alloy	http://www.youtube.com/watch?v=Z4U69ocUrtw&feature=youtu.be	
-joule heating for actuation	References: Huang, W.M., Gao, X.Y., Loo, B.K., He, L.M. and Ngoi, B.K.A., Micro gripper using two-way shape memory alloy thin sheet, <i>The International Conference on Superelastic Technologies and Shape Memory Materials (SMST-SMM 2001)</i> , 2-6 September, 2001, Kunming, China, pp43 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	

Multiple-shape memory effect in shape memory materials

Multiple-SME in SMA (bending)	http://www.youtube.com/watch?v=kYugtD1vZzM	
	Reference(s): Huang, W.M., Yang, B. and Fu, Y.Q., <i>Polyurethane shape memory polymers</i> , Taylor & Francis/CRC Press, 2011 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640	
Multiple-SME in SMA (SSP)	http://www.youtube.com/watch?v=qowuEsnX4Q4	
	Reference(s): Huang et al, Shape memory materials, <i>Materials Today</i> , Vol. 13, 2010, pp54-61 Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640 Tang C, Huang WM, Wang CC, Purnawali H, The triple-shape memory effect in NiTi shape memory alloys, <i>Smart Materials and Structures</i> , Vol. 21,	

2012, 085022

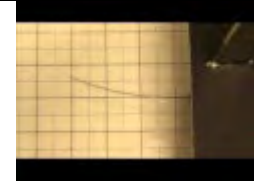
Multiple-SME in SMA (LSP)

<http://www.youtube.com/watch?v=BzOIBdyTTl8>

Reference(s):

Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640

Tang C, Huang WM, Wang CC, Purnawali H, The triple-shape memory effect in NiTi shape memory alloys, *Smart Materials and Structures*, Vol. 21, 2012, 085022



Multiple-SME in SMA (rotation)

<http://www.youtube.com/watch?v=r-ydr6kWr8w>

Reference:

Tang C, Huang WM, Wang CC, Purnawali H, The triple-shape memory effect in NiTi shape memory alloys, *Smart Materials and Structures*, Vol. 21, 2012, 085022



Quick demo of triple-SME in Nitinol

<http://youtu.be/B3AcK0mYTHU>

Reference:

Tang C, Huang WM, Wang CC, Purnawali H, The triple-shape memory effect in NiTi shape memory alloys, *Smart Materials and Structures*, Vol. 21, 2012, 085022



Triple SME in SMA:
reprogrammable

<https://youtu.be/5tiEWJUnBIU>

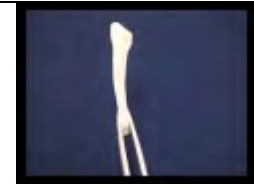


Multiple-SME in SMP A

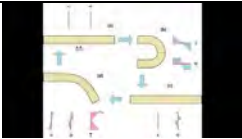
<http://www.youtube.com/watch?v=8-XXK3lOBks>

Reference(s):

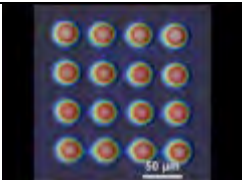
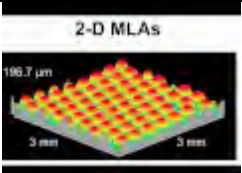
Sun et al, Stimulus-responsive shape memory materials: a review, *Materials and Design*, 33, 2012, 577-640



Multiple-SME in SMP B	http://www.youtube.com/watch?v=1aXj9CnNreI	
Multiple-SME in SMP C	http://www.youtube.com/watch?v=e2-xpqxHjxg	
Multiple-SME in SMP D	http://www.youtube.com/watch?v=e2z504n9oto Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640 Huang et al, Water-driven programmable polyurethane shape memory polymer: demonstration and mechanism, <i>Applied Physics Letters</i> , Vol.86, 2005, 114105	
Multiple-SME in SMP (in water)	http://www.youtube.com/watch?v=kfUG24HW9To Reference(s): Sun et al, Stimulus-responsive shape memory materials: a review, <i>Materials and Design</i> , 33, 2012, 577-640 Huang et al, Water-driven programmable polyurethane shape memory polymer: demonstration and mechanism, <i>Applied Physics Letters</i> , Vol.86, 2005, 114105	
Multiple-SME in silicone/wax hybrid A	http://www.youtube.com/watch?v=WDEcWDl6qPA Reference: Huang et al, Shape memory materials, <i>Materials Today</i> , Vol. 13, 2010, pp54-61	

Triple SME: straight to curve to straight in hot water (material EVA)	https://youtu.be/EdfTt_eu7xw	
Multiple-SME in silicone/wax hybrid B	http://www.youtube.com/watch?v=d1BybLK_VgE	
Triple-shape memory effect in PU sponge	http://youtu.be/9UQgYrFHsRw Reference: Huang, W.M., Yang, B. and Fu, Y.Q., <i>Polyurethane shape memory polymers</i> , Taylor & Francis/CRC Press, 2011	
An introduction to the triple-shape memory effect in NiTi shape memory alloy	http://youtu.be/YFrF-3vhJE8	

Shape memory effect in materials

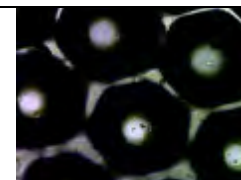
2-D microlens array atop PMMA_A	http://youtu.be/7cC7LktBNBU Reference: Zhao Y, Wang CC, Huang WM, Purnawali H, An L, Formation of micro protrusive lens arrays atop poly(methyl methacrylate), <i>Optics Express</i> , Vol. 19, No. 27, 2011, pp.26000-26005	
2-D microlens array atop PMMA_B	http://youtu.be/zqz0FUNGh4M Reference: Zhao Y, Wang CC, Huang WM, Purnawali H, An L, Formation of micro protrusive lens arrays atop poly(methyl methacrylate), <i>Optics Express</i> ,	

3-D microlens array atop PMMA
(insect eye)

http://youtu.be/6JDdpI8qu_w

Reference:

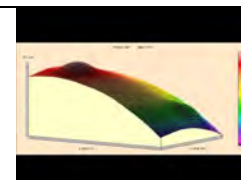
Zhao Y, Huang WM, Purnawali H, Three dimensional surface patterning atop poly(methyl methacrylate) (PMMA), *Applied Mechanics and Materials*, Vol. 161, 2012, 292-295



2D/3D microlens array atop PMMA

<https://youtu.be/YVX2xwGoNjY>

- MSc 2015



Thermo-responsive shape memory
effect in nail

<http://youtu.be/2dE28Ou3j3c>

Reference:

Huang WM, Zhao Y, Wang CC, Ding Z, Purnawali H, Tang C, Zhang JL, Thermo/chemo-responsive shape memory effect in polymers: a sketch of working mechanisms, fundamentals and optimization, *Journal of Polymer Research*, accepted



Moisture induced SME in silk

<http://youtu.be/pTTzi1r6Y20>



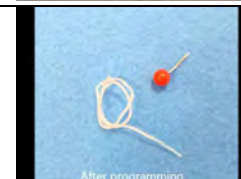
Water-driven shape memory effect
in human hair

<http://youtu.be/ca-0UQPfQpY>



Water responsive shape memory
effect in cellophane
noodles/Chinese vermicelli

<http://youtu.be/ZHZANP9cCJ8>



Elasticity and water-responsive shape memory effect in DNA

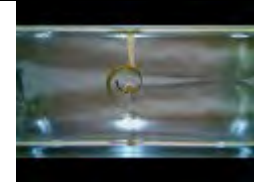
<https://youtu.be/1LJWrrIy8Qw>

- Sample and preparation:
DNA from banana, dried.
Wet in room temperature
water.



Water-responsive shape memory effect in leaf

https://youtu.be/-y6le_8DK8Q



Shape memory effect in plant leaves

<https://youtu.be/zxhMfhrnw8w>

- water and hot water
activated shape recovery



Water-responsive shape memory effect in shrimp feelers

<https://youtu.be/LTLqnuVXWHU>



Comparison of shape change effect and shape memory effect in polymeric membrane

<https://youtu.be/FSSj6Y91c-E>



Advanced shape memory sensors

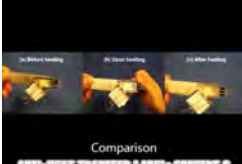
Advanced shape memory polymeric sensors	http://youtu.be/H8n4x89iEAU	 A brief introduction of new sensor applications of the thermo-responsive shape memory effect in polymeric materials as - Temperature sensor to track the highest temperature - Advanced anti-counterfeit label/component
Shape memory temperature label v1 FYP 2013/14	http://youtu.be/Z9gmLCx8WCY	 - From the propagation of line to know the heating temperature.
Anti-heating transfer label FYP 2013/14	http://youtu.be/rRnxa5C2eJA	 防熱転移標本 SMT 2014.01.09
Anti-heating transfer label (color change) FYP 2013/14	http://youtu.be/mnAopDH8BLo	
Anti-heating transfer label (word version) FYP 2013/14	http://youtu.be/TI4qNqQzdjY	
Void after heating	https://youtu.be/yc49B27F0D8	 9/17 09:47 2013

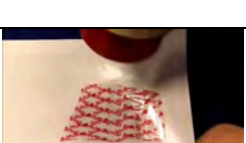
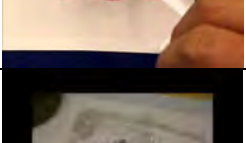
2D to 3D using heat shrink tube: flat to twisted	https://youtu.be/ZISZ--JVhuY	
Anti heat transfer label proof of concept I FYP 2013/14	http://youtu.be/t3s3BKyYVg0	
Anti heat transfer label proof of concept II FYP 2013/14	http://youtu.be/UNKS-7V8EII	
Anti heat transfer void paper - 1st prototype FYP 2013/14	http://youtu.be/IS-8-MvmafA	
Anti heat transfer void paper (II) - 2nd prototype FYP 2013/14	http://youtu.be/KsLCcsfMt7E	
Anti heat transfer label 20150404a	http://youtu.be/frQasMyNz-o	
Anti-heat transfer void paper 20170820	https://youtu.be/WPakRZftOYc	

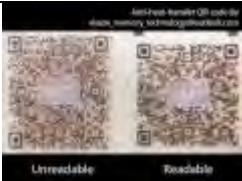
Testing of shape memory void paper 20170822 - With anti-heat transfer function	https://youtu.be/pocLyCj5xLE	
Testing of beer can packaging membrane	https://youtu.be/V1XiKtWdOZI	
Testing of heat shrink labels of plastic bottles	https://youtu.be/NAQZZ5-F0x8	
Heat shrink drink bottle labels	https://youtu.be/j604ruoIz4Q	
Origami with 1D heat shrink film: orientation dependent	https://youtu.be/ED0jH5ZA8B0	
Screen printed heat shrink label: before and after heating	https://youtu.be/TnWy1zbiEho	
Testing of heat shrink film (for battery packaging)	https://youtu.be/D8j8YNJbDRc	

Heat shrink label 20160318 - Crack opening	https://youtu.be/NxQwGXA7DOw	
Cracking upon heating by lighter (only)	https://youtu.be/bA8BMR6Pj1c	
打火机加热开裂破损膜	https://youtu.be/dk-RyKjwWkM	
Shape memory label - (Demonstration) for anti-counterfeit; anti-heat transfer etc.	http://youtu.be/kAksXAQy8u4	
Dual-pattern anti-counterfeit label - Upon heating in hot water, one pattern disappears, so that we can clearly recognize one single word pattern of "SMT".	http://youtu.be/4sPYW6QG78w	
Anti-counterfeit card 29062015 - Heating to disappear or appear	http://youtu.be/1qZaItEqnQ4	

Step-by-step disappearance of SMT impressions (NCV) - SMT impressions disappear upon gradual heating	https://youtu.be/Z6cL6L6D_Ws	
Gradual heating for disappearance of impressions in a step-by-step manner - Comparison: using hair dryer and hot water	https://youtu.be/GFVS3mwNddg	
Anti-heat transfer/anti-counterfeit label V20170420	https://youtu.be/yyYRTzoVT0Y	
Comparison of two films 20170831 - Stress-whitening, embossing and shape memory	https://youtu.be/SYL_CTb7_k0	
热驱动形状记忆效应和银纹	https://youtu.be/mFoGdqhqUc8	
Removal of stress whitening and shape recovery in a plastic film (polarized video)	https://youtu.be/nrLEx1O1cyM	

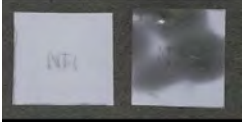
Comparison of shape recovery in 0.2 mm thick film using different molds for embossing - Shape memory effect in polymers for anti-counterfeit applications	https://youtu.be/On1v1yLYye4	
Recovery of impression atop plastic film upon heating	https://youtu.be/hIotGv4bBhw	
Structural coloring and SME	http://youtu.be/PzLknRDEQTc	
Heating induced color change in nano-structured PMMA film	http://youtu.be/5AFXulY35Lg	
Anti-heat transfer label ABCD 4 concepts, 20140217	http://youtu.be/iJxZ1OufEnE	
Structural coloring atop soft silicone 20250630	https://youtu.be/aNwBw_FbUAI	
Soft AB resin with structural coloring effect	https://youtu.be/xw6iQcOXPBI	

Structural coloring atop curved surfaces (AB resin)	https://youtu.be/DIVmmgKNyLU	
Structural coloring atop curved surface: snake	https://youtu.be/a7-WnaJLOY8	
Structural coloring atop curved surface: solid state UV cross linked resin	https://youtu.be/vOI4iLs62eE	
Structural coloring atop curved surface (20250715)	https://youtu.be/0TEwq6f17b4	
Structural coloring via shape memory mould	https://youtu.be/Bh_U8XNL3cM	
Curved mould with structural coloring effect 20251222A	https://www.youtube.com/watch?v=6sCNy0DER68	
Anti heat transfer label _concept based on heat shrink	http://youtu.be/jYt2YkXK7uw	
Integration of SME with QR code 20160201	https://youtu.be/FKPhD-sNPKs	

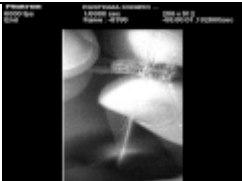
Anti-heat transfer QR code	https://youtu.be/F7vNTB7NodU	
Temperature sensor AB 2 concepts, 20140217	http://youtu.be/Sl94NonFIF8	
Pattern change upon heating - FYP 2013/14	http://youtu.be/XJNuGrPCiCQ	
Temperature memory effect in rubber-like shape memory hybrid URECA 2013/14	http://youtu.be/iEJiHRJpyGo	
Shape memory anti counterfeit label with a water mark Upon heating to 55°C, a water mark of 50 (mirror image) appears within the existing surface pattern. Further heating to 90°C, all pattern disappears. A 2014/2015 FYP project.	http://youtu.be/HRRqoHIEM4k	
3D finger print: disappear upon heating	http://youtu.be/uoccTPrQ_IA	

Finger print captured by elastic shape memory hybrid and wax: a comparison	https://youtu.be/imsQHOAhJ28 1. Finger prints are about the same 2. Finger print capture: before wax solidification vs. body/room temperature of shape memory hybrid 3. Wax: normally brittle vs this shape memory hybrid: highly elastic 4. Upon heating, wax melts vs shape memory hybrid recovers its original shape	
Surface pattern transfer 20250706a	https://smartmatertech.weebly.com/surface-capture.html	
Break circuit when over-heated based on the SME	https://youtu.be/pNE3CfFIptQ	
Shape memory anti-heat transfer hologram sticker Advantages: 1. Hologram sticker 2. Easy fracture upon tearing 3. Cutting opening upon heating	https://youtu.be/sFgRckh16Zk	
Anti-heat transfer hologram sticker 20160926a testing	https://youtu.be/uefwzHyoCeY	
Heating laser anti counterfeit paper Testing	https://youtu.be/_DGuu-iigc	

Laser label Testing	https://youtu.be/FIsChShlM84	
Anti-heat transfer hologram sticker 20160928E	https://youtu.be/aEecEY1f0oo	
Anti-counterfeit hologram sticker: cracked upon heating	https://youtu.be/WuRMGQia9pI	
Shape memory hologram label 20170822	https://youtu.be/PODkFKRU6XE	
Testing shape memory effect in holograph paper	https://youtu.be/bd3PScCKVLI	
Removal of impression atop coffee bag upon heating (comparison)	https://youtu.be/eEidORMxMdw	

High temperature shape memory anti-counterfeit film	https://youtu.be/4uqDPT8RJF0	
High temperature anti-counterfeit sticker	https://youtu.be/4647q1cE4G8	
High temperature anti-counterfeit sticker (lighter version)	https://youtu.be/4RK67AZ3eFM	
Cracking and debonding upon heating	https://youtu.be/ziFQD30c8VA	
Heating to remove watermark	https://youtu.be/FzaMb_rnaV8	
Shape memory effect based temperature/anti-counterfeit labels and elastic/stretchable RFID 基于形状记忆效应的温度/防伪标签及弹性/可拉伸 RFID	https://youtu.be/6aulkwf1u5s	

Insects

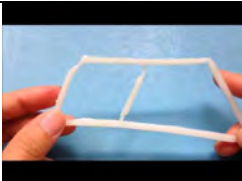
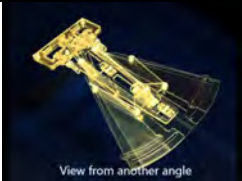
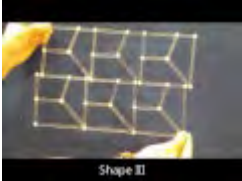
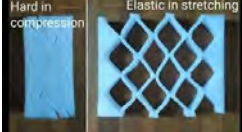
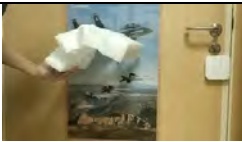
Damesfly (high speed camera) Mode A	http://www.youtube.com/watch?v=96DKYwVDH0M	
Damesfly (high speed camera) Mode B	http://www.youtube.com/watch?v=WEgK3UdUoq0	
Dragonfly (high speed camera) Mode A	http://www.youtube.com/watch?v=Nw_FD4yIwa4 Reference(s): Chen et al, Kinematics of dragonfly (sympetrum flaveolum) flight, 6 th World Congress of Biomechanics, Singapore, 1-6 August 2010, in <i>IFMBE Proceedings</i> (CT Lim and JCH Goh eds.) Vol. 31, pp 56-59, 2010.	
Dragonfly (high speed camera) Mode B	http://www.youtube.com/watch?v=QthIIWqtT9Q Reference(s): Chen et al, Kinematics of dragonfly (sympetrum flaveolum) flight, 6 th World Congress of Biomechanics, Singapore, 1-6 August 2010, in <i>IFMBE Proceedings</i> (CT Lim and JCH Goh eds.) Vol. 31, pp 56-59, 2010.	

Retractable/deployable structures

Retractable roof A	http://www.youtube.com/watch?v=vVEPzPzUTkQ	
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Retractable roof B1	http://www.youtube.com/watch?v=GL3cn_pWrl8	
Retractable roof B2	http://www.youtube.com/watch?v=xfAhIj2AxMM	
Elastic Geodesic Grids 202211: from concept to 3D printed single piece	https://youtu.be/70JRda1uDxM	
Unfolding of mechanical hinge with minimal impact - Heating for activation (real time video)	https://youtu.be/rUA2IUvUIQY	
Deployment of elastic hinge in hot water	https://youtu.be/hs_DB20VkSE	
Unfolding of elastic hinge for minimum impact (2nd version)	https://youtu.be/_CryZ63veCg	

Slow deployment of elastic hinge in 70 Deg C oven (speed: 8x)	https://youtu.be/PjJPLVSLbdU	
Controlled deployment of elastic hinge based on the shear-thickening effect	https://youtu.be/zLoN_2tYDaE	
Controlled unfolding of elastic hinges 2021/2022 A	https://youtu.be/nag4EK7Yqyk	
Controlled unfolding of elastic hinges (hairdryer heating)	https://youtu.be/IO9PNkoMLes	
Rigid temporary shelter (deployment)	http://youtu.be/-QB8hNIVvZs	
Rigid temporary shelter (folding)	http://youtu.be/KNRsB5XfZJs	
Retractable roof (summary)	http://youtu.be/CljilOV9III	

Compliant bistable TPU structure	http://youtu.be/afAAc5ZSfFA	
A 2013/14 FYP project		
From bistable to compliant mechanism to 4D printing (2015.11.05)	https://youtu.be/nr7WVtAUls8	
Bistable structure: from pin-jointed to hingeless	https://youtu.be/OtwXs-zGWm8	
Structure with triple stable positions	https://youtu.be/LCvwcnKojis	
Instant switching between tension and compression springs using the shape memory effect	https://youtu.be/XPUK2VEKDLE	
Rapid switching between hard and soft in bi-stable structure	https://youtu.be/_3QyzkdKTyI	
Rapid switching in stiffness	https://youtu.be/ms0WV2orANU	

Asymmetric response to tension/compression through structural design

<https://youtu.be/VNeZqbhb8qg>



Hydrogels

Hydrogel expansion

<http://www.youtube.com/watch?v=hrmdCT-Bp9k>

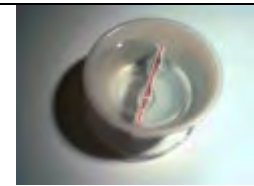


Hydrogel in straw

<http://www.youtube.com/watch?v=T9Vdkm2PjH0>

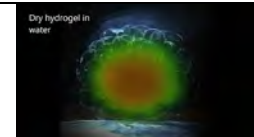
Reference(s):

Sun et al, Wet to shrink: an approach to realize negative expansion upon wetting, *Advanced Composite Materials*, Vol. 18, No. 2, 2009, pp 95-103



Dry hydrogel in water

https://youtu.be/3qzflpI_Muw



Hydrogels wetted in water for different period of time

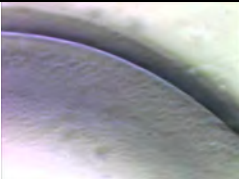
<https://youtu.be/INLGPIyBIhg>



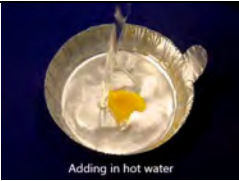
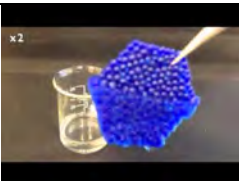
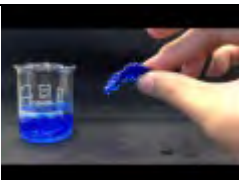
Water wetting induced temporary surface wrinkling

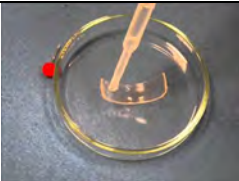
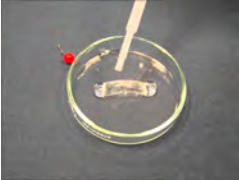
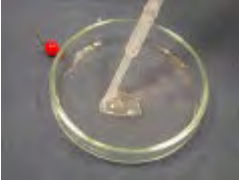
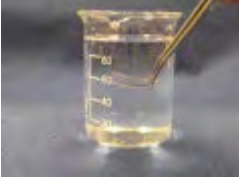
<https://youtu.be/SH6QPW-w2S8>



Water induced temporary wrinkling atop hydrogel	https://youtu.be/9MKHUnd8o88	
Water drops on hydrogel	http://youtu.be/8HfaJhs13Mk	
Tough hydrogel wetted by water droplet - Evolution of surface morphology	http://youtu.be/mxFdEHKYXq8	
Wet twice tough hydrogel by water droplet - Evolution of surface morphology	http://youtu.be/5hUQJD_JKqo	
An introduction to shape memory/change effect in hydrogel	http://youtu.be/4FjdVHPkoGc	
Redox glue thin film wetted by water droplet - Observation under microscope	http://youtu.be/2y2K1bJ5_OQ	
Water droplet on marker pen painted dry PVA glue film (8x)	https://youtu.be/BRw83Io9OQI	

Water droplet on marker pen marked dry PVA glue film	https://youtu.be/yw_puCNkiNc	
Hydrogel wetted inside straw	http://youtu.be/hRID6EuxfAA	
Separation of dry-bond hydrogel pieces by water	https://youtu.be/Pmc1tkWIFDM	
Wetting flattened dry hydrogel tube by water droplet - real time video	https://youtu.be/eaAsW1CTpiQ	
Shape recovery of dry hydrogel by water droplet	https://youtu.be/M-mohIq7E7E	
Wetting pre-bent dry hydrogel atop wet hydrogel	https://youtu.be/21q7JAIYj2c	

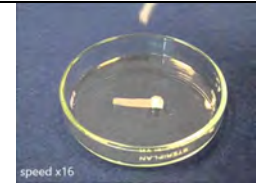
Disassembly of hydrogel in hot water	http://youtu.be/-tXCCU3S9VE	 Adding in hot water
Active disassembly of hydrogel in water	http://youtu.be/BQldwtrD2d0	
Wetting in water for disassembly - 2014/15 FYP	http://youtu.be/qrwzKJmNpmI	
Active dis-assembly in room temperature water - 2014/15 FYP	http://youtu.be/uH6Vra3ThFQ	
Active dis-assembly in 80°C water - 2014/15 FYP	http://youtu.be/FjhrYF2iL9k	
Dancing upon wetting - Hydrogel changes shape upon wetting by water droplet	http://youtu.be/qv97FtCgYnY	 Real time video: Some pieces have been 'wicked'

Wetting (gradient) hydrogel strip by water droplet	http://youtu.be/NdJxFpDFBiI	
Wetting (gradient) hydrogel thin wire by water	http://youtu.be/xRIB4AS7EPc	
Water induced shape change in dual-layered hydrogel strip	http://youtu.be/zyqYiZKeDsc	
Water induced shape change in dual-layered hydrogel II	http://youtu.be/-PGcxa6gr4w	
Gradient hydrogel thin film in wetting/drying cycling	http://youtu.be/Sk7MSoaaodY	
Wetting 0.4 mm thick dry hydrogel by water/droplet	http://youtu.be/FJyxgifBBKY	

0.4 mm thick gradient hydrogel
(one set) wetted by water/droplet

<http://youtu.be/Jykcdfp4q0>

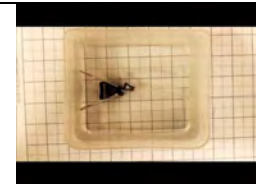
- A full set of experiment



Wetting gradient hydrogel strip in
water

<http://youtu.be/V7V9asau0nc>

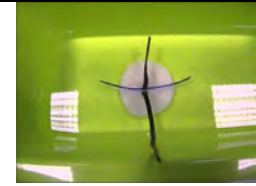
- 0.8 mm



0.8 mm gradient hydrogel strip
wetting/drying

<http://youtu.be/7XK7JRwDoEY>

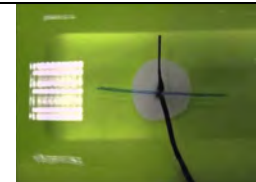
- one wetting/drying cycle



0.8 mm gradient hydrogel strip
wetting/drying

<http://youtu.be/ov4TOSjNWqQ>

- Repeat test



Wetting/drying 0.8 mm thick
gradient hydrogel wide strip

<http://youtu.be/uZ94XCYM1LI>

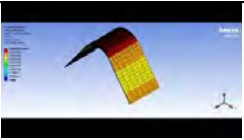
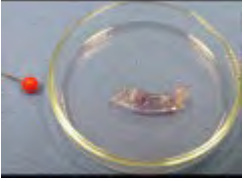
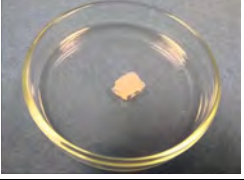


Place one water droplet on 0.8 mm
thick gradient hydrogel

<http://youtu.be/CELv4HNdDg0>

- two tests



Water droplet on hydrogels (simulation)	https://youtu.be/el3Anz2OD7Q	
Wetting pre-stretched tough hydrogel in water	http://youtu.be/3LoLbSOr67U	
Partial wetting and then drying toughgel	http://youtu.be/fZXlPY7rwYM	
Wetting hydrogel-PEG hybrid by one water droplet	http://youtu.be/zmSkmVmzaII	
Water content dependent response of redox glue	http://youtu.be/tA7PYMF1OTk	
SME in a stretchable hydrogel 20161125 - Heat/water-responsive shape memory effect, water-content dependent	https://youtu.be/glHJi5OLZ_s	

Heat induced SME in a stretchable hydrogel <https://youtu.be/LiOzNvaGHBo>

- Programming by stretching



Heating/water-responsive SME in cross linked P407 https://youtu.be/vH_oF6l0uG4



Structural coloring in hydrogel <https://youtu.be/FvGxyjHVP44>



PVA glue + ... for structural coloring <https://youtu.be/QuEWstCmR3I>



Electroactive gel

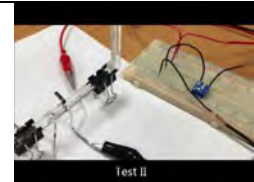
Electro-active gel 201606 <https://youtu.be/rMkd-JdBIU>

- Less than 15 V for activation



Low voltage activated electroactive ionic gel (20161108) <https://youtu.be/5I91Q5ZsY7Q>

- 2 x 1.5 V batteries



Low voltage (9 V) activated electroactive ionic gel <https://youtu.be/bO3X3HSOmgc>

- 20161110



Morphing

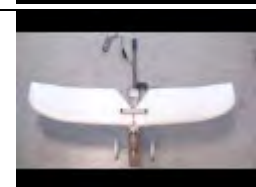
Reversible Dimple <http://youtu.be/jhdBpQGTrcQ>

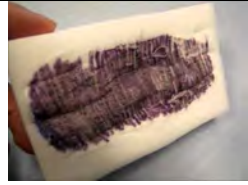


Morphing wing (prototype) http://youtu.be/Y3jvESg_UhM



Morphing wing I <http://youtu.be/rjmdIKnVubI>



FlexBat (Dec. 2025)	https://youtu.be/J5ECKKZq53E	
Flexible skin	http://youtu.be/rIb8cuNDDSw	
Elastic sponge coated with a thin layer of TPU	http://youtu.be/zhKUqwwxRKU	

Devices for touch screen

Button for gloves for all types of touch screen devices	http://youtu.be/YAwJmePIfY4	
URECA 2012/13	Instead of buying a special glove, now you can enjoy playing touch screen devices in cold days when you are still wearing your own glove.	
Touch screen tool for long time playing games	http://youtu.be/Plu7RGx1Bs	
URECA 2012/13	You may get fingers tired after playing with touch screen devices for too long. Now there is a simple to help you to play games forever without fingers FIXED.	

Tip for touch screen (Version II)	http://youtu.be/GyIl78q75dM	
URECA 2013-14		
Snap fastener and finger protector for touch screens	https://youtu.be/x1XEk-Bohhk	
- Dec 2015 (part-time FYP)		
Turn normal glove into touch screen glove	https://youtu.be/xVIBLFaMTNQ	

Buttons-on-demand

Buttons are defined in your own way	https://youtu.be/geqaygW4Csk	
Buttons on demand: conceptual design and testing prototype	https://youtu.be/WkiA-cIVGQM	
Buttons-on-demand (individuals)	https://youtu.be/JjQKKtlbJhE	

Buttons on demand: testing of prototypes

<https://youtu.be/GAkdQ3tdocc>



Interesting technologies

Stress whitening in dots produced by indentation

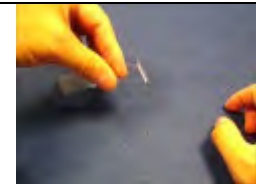
<http://youtu.be/af3uqSL3PtM>

- Stress whitening and removal
- Observation under a microscope



Stress whitening of write-on transparency in bending and removal

<http://youtu.be/hZMAcbtvNfM>



Stress-whitening via bending

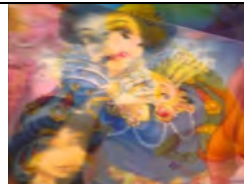
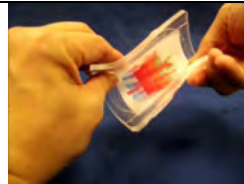
<https://youtu.be/mBm4bUIc5P4>

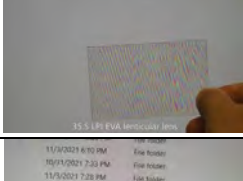
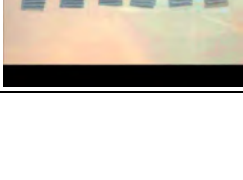


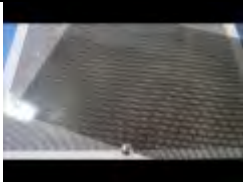
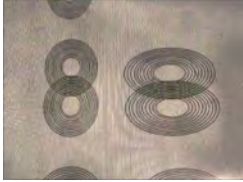
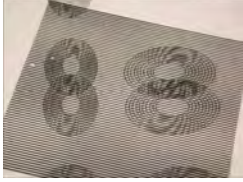
Manual folding/ heating partial unfolding of transparent film

<https://youtu.be/F2-gQZa0pNg>



Lenticular lens FYP 2013/14	http://youtu.be/DXRqQySFI5Y	
Lenticular lens effect A	http://www.youtube.com/watch?v=39uK6VpWcAY	
Effect of lenticular lens B	http://youtu.be/uLGZlutc0QE	
Lenticular lens atop lenticular lens	http://youtu.be/GIJMQfKhyWc	
Effect of lenticular lens C FYP 2013/14	http://youtu.be/fNBzjQdu2L4	
Flexible and stretchable lenticular lens FYP 2013/14	http://youtu.be/MCKgRKAJOnc	

Effect of lenticular lens D - Rotation of lines upon heating FYP 2013/14	http://youtu.be/28pgcDRbtk5	
Heating to alter surface pattern - Possible applications: temperature sensor, anti-heat transfer label	https://youtu.be/5CL5oupLe98	
Disappearance of lenticular lens upon heating - Possible applications: temperature sensor, anti-heat transfer label	https://youtu.be/Czj2n-8NB4E	
Heating for Moire effect via lenticular lens sheet - Potential application: anti-heat transfer label	https://youtu.be/UoItijNrK-0	
DIYed lenticular lens: right atop monitor	https://youtu.be/ZvIO2P7GJRM	
Patterning (interference) (20211124)	https://youtu.be/pmf4fBl6vmw	
Effect of lenticular lens E FYP 2013/14	http://youtu.be/DpPZRk9QvU4	

Moire pattern A FYP 2013/14	http://youtu.be/8PUu-fCQx9Y	
Moire pattern 20150404a A 2014/2015 FYP	http://youtu.be/cjwBv3CT3mw	
Line lens interference - two patterns	http://youtu.be/xoxLrhDI9Kk	
Line lens interference	http://youtu.be/esaJcfnLpAE	
Circular line lens interference	http://youtu.be/nhiqWggLPiI	
Circular line interference	http://youtu.be/pPKwCmft2WE	

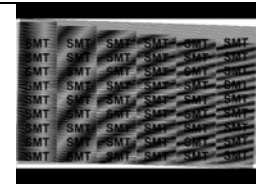
Lines interference 20150407a

<http://youtu.be/g0xas8cygbA>



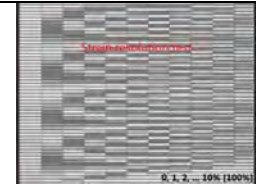
Simulation of Moire interference

<http://youtu.be/5DVF6iQA5AU>



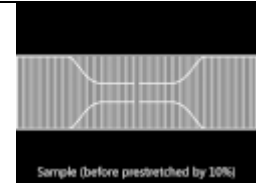
Moire: testing of resolution

<http://youtu.be/nGbKhKbnEZg>



Testing of Moire effect 20160331

<https://youtu.be/YS10ygJtQIM>



Moire-size effect (Mi6 version)

<https://youtu.be/MDI8Y7csUgw>

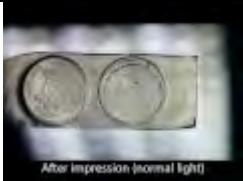


Comparison of surface patterned vitrimer stretched under different conditions

<https://youtu.be/hrxkpGGho5M>

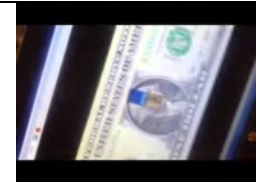
- Interference, photo-elasticity, and coloring effect



Photoelastic phenomenon in PC	http://youtu.be/aHPNBA-vY3I	
Room temperature stretching of PC (photoelasticity)	https://youtu.be/-l3DJX8Wyso	
Stress concentration observed via photoelasticity - Equipment: computer screen, polarized sunglass, transparent polymer	https://youtu.be/qV53bAPIWZU	
Observation of internal stress in water bottle based on photoelasticity	http://youtu.be/SCT4zh-zNNI	
Photoelasticity in EVA FYP 2013/14	http://youtu.be/y6m5c-0A8HM	
Bistable structures (photoelasticity)	https://youtu.be/LwFPzhErmu4	
To spot "invisible" using polarizing filter	http://youtu.be/nzkMokg8h7E	

Nano imprinted thin film under polarized light
- Between PC monitor and polarized filter

<http://youtu.be/VXF8qatKZHk>



Nano-imprinted thin film (transparency)

<http://youtu.be/b8e4mZTdmU0>



3D with naked eyes

<http://youtu.be/ewshe9wbnjk>

- Exercise for fun



3D cat

<https://youtu.be/cQrZlrx1tys>

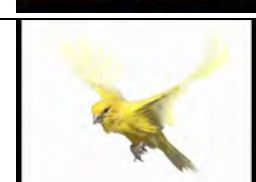
- Just for fun



3D effect of flying bird

<https://youtu.be/MG8hjvoUC6w>

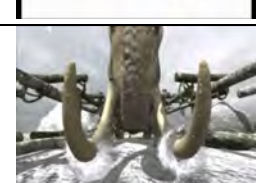
- 3D effect (exercise)



Testing of 3D effect

<https://youtu.be/bjwoRRK5x4I>

- Just for fun.



Testing 3D effect based on light field (Lytro) photos

<https://youtu.be/kQurFUIRGto>



Healing cutting by water droplet

<http://youtu.be/aFs-jnGsNdQ>

- A single water droplet to heal a cutting line produced by a sharp blade.



Wetting by water to remove scratches

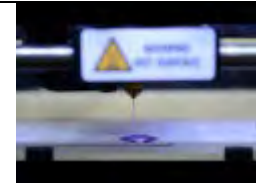
https://youtu.be/yPhXnO_s5UI



3D/4D printing

3D printing

<http://youtu.be/OlifGVFVcWI>



3D printing 12 years: a zodiac sign

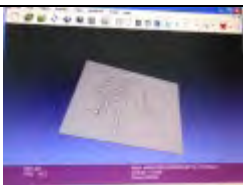
<https://youtu.be/mijBOUsw8ec>

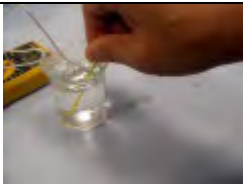
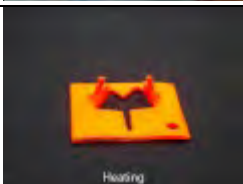
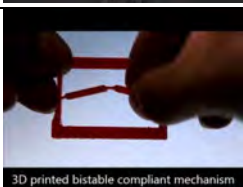


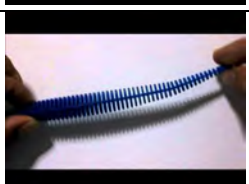
Comparison of three types of 3D printing PLA filaments

<https://youtu.be/zlkk3KWi0ig>

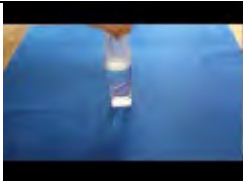
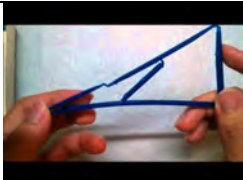
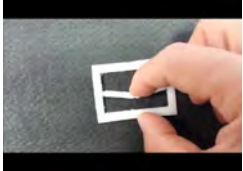


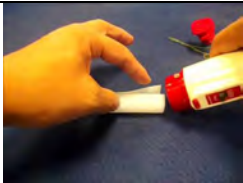
3D Printed Jobs	http://youtu.be/euabPucCRiE	
Light angle effect on 3D printed RFID surface	https://www.youtube.com/watch?v=jvyc3J3OtJ0	
Whitening of Eiffel tower - 3D printed, change color upon heating	https://youtu.be/nr4qZPXHaEg	
201505 3D printed Steve Jobs - A 14/15 FYP project	http://youtu.be/oWgc0QpoocQ	
From 2D image to 3D printed card	http://www.youtube.com/watch?v=zUB5qNOK7oo	
SME in PLA Chinese characteristics	http://youtu.be/gWbSoAjuXBs	

SME in 3D printed silk PLA	https://youtu.be/aRotaVjh3tc	
The SME in 3D printing color change filament	http://youtu.be/IRXKE8YSUgY	
Magic word by 3D printing	http://youtu.be/YUTCWnJex6M	
3D printed elastic shape memory "monkey" - 4D printing ☺	https://youtu.be/QDqaqGY9TsU	
4D printed Ox head: Happy Ox year	https://youtu.be/A8uRIfwi1SQ	
SME in 3D printed PLA in shape memory cycling	http://youtu.be/8AQ42YUOGnE	
3D printed bistable compliant mechanism	http://youtu.be/4Jp0eLvAhRs	

3D printed bistable compliant mechanism -A 1st year project 2013/14	http://youtu.be/jkf8CssnRNI	 3D printed bistable compliant mechanism
Active disassembly of 3D printed PLA mobile phone case - Proof of concept FYP 2013/14	http://youtu.be/3IKDFKW1VJg	 (F) Circuit Board stuck in Housing
3D printed PLA staples with self tightening function - Proof of concept FYP 2013/14	http://youtu.be/NJO8Qx2ASLc	
3D printed flexible snake	http://youtu.be/kPxPEVcymmo	
Shape memory effect in 3D printed PLA snake	http://youtu.be/Pu2JCGqTBi8	
Comparison of 3D printed snakes using two filaments - PLA and flexible filaments	https://youtu.be/Q6dDa0uUkNA	

3D printed highly elastic shape memory snake	https://youtu.be/djHRtWITWqg	
Folding unfolding of 3D printed structure - A year 1 project 2013/14	http://youtu.be/722AutKduqs	 Deployment of a simple structure
From wheel to flower - A year 1 project 2013/14	http://youtu.be/MrJsGonBwQg	 From wheel to flower (3D printed) SMT @April 2014
Morphing - A year 1 project 2013/14	http://youtu.be/vQ98TTelDSM	 A 1st year project @MAE/NTU
Shape memory effect in 3D printed heart shaped PLA	http://youtu.be/BKsdMoczdpU	
Testing the shape memory effect in 3D printed PLA spring (I)	http://youtu.be/WrsJZnegZVs	

Testing the shape memory effect in 3D printed PLA spring (II)	http://youtu.be/dxaGPbfl4w	
3D printed magic cup -A year 1 project 2013/14	http://youtu.be/swHjFokDpF0	
SME in 3D printed glasses frame via DLP	https://youtu.be/W15OFJ817yc	
From 3D to 4D printing: techniques and demonstration	http://youtu.be/6qnWUOMcfSw	
Testing of heating-responsive shape memory effect in 3D printed PLA	https://youtu.be/54OaqTSt-1w	
3D printed compliant structure (nylon: Esun)	http://youtu.be/m-MdQpRmuK4	
Rapid/slow recovery or bistable structure: temperature and viscoelasticity dependent	https://youtu.be/ffndhLO_vWA	

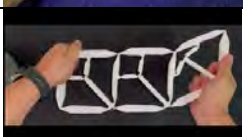
3D printed compliant structure switchable between 2D and 3D	https://youtu.be/UvxxvR6TXTOw	
2D to 3D shape switching 20211125	https://youtu.be/Fp1kAY2mQoA	
Unfolding 3D printed 4D gift card Steve Jobs - Heating using a hair drier to unfold a 3D printed gift card	http://youtu.be/UE4JYopFvrI	
Shape memory effect, bistable structure, compliant mechanism and 3D/4D printing - a 2014 FYP @ MAE/NTU	http://youtu.be/16Bwfj8qFQY	
4D printing? 3D printed compliant mechanisms - Elastic shape recovery/bistable	https://youtu.be/qmYUfvU_geY	
3D printed bistable compliant mechanism - A part time FYP @MAE/NTU, 2015.11.04	https://youtu.be/4TAjcK-7Kg8	
Animation of shape switching	https://youtu.be/3EAQecEEr6I	

Shape memory hybrid structure	https://youtu.be/AdkisGbjf6k	
Convert 3D printed structure from bistable to single-stable	https://youtu.be/du7hSbwLHH4	
A FDM printed shape memory structure	https://youtu.be/8Da7RLP98RU	
Programming condition controlled recovery 20251229A	https://youtu.be/4SLX9oDi5lA	
Shape memory structure (unit study)	https://youtu.be/dT0eItR-XJc	
Shape memory structures 20240926	https://youtu.be/WA4x_WEG4NQ	
Shape memory structures 202040927	https://youtu.be/6vs6h9hrjw4	
Structured materials for morphing like machines	https://youtu.be/tgDKR3qgu04	
Structural coloring in 3D printing	https://youtu.be/iBFNb6YrpwU	

3D printed structural coloring	https://youtu.be/VQ9aTuXi9Ao	
20240909 watch band (FDM printed with coloring effect)	https://youtu.be/Czii0uTZwto	
Watch band printed with structural coloring effect (20241004)	https://youtu.be/nYGM_V3v6BM	
Watch band by FDM 20241030	https://youtu.be/WoHtNKA4Xr0	
Structural coloring 20241028a	https://youtu.be/FmdsmMvlixA	
3D printed holographic shape memory snake	https://youtu.be/KB2pLZ74Gqw	
4D printing + holographic effect	https://youtu.be/s_3sP0gGGCI	
FDM printed snake: testing shape memory effect 20241112a	https://youtu.be/t3pNnPRT6PM	

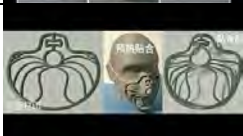
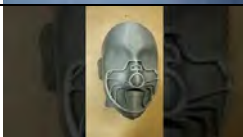
FDM: brittle after a couple of years	https://youtu.be/Fsi9eZ2cke0	
Influence of size and infill on stability (printed some days ago)	https://youtu.be/ZTREIihRnWo	
FDM printed bistable structures: size and infill dependent stability	https://youtu.be/Aznbo3H0iOI	
FDM printed PLA, after a couple of year: shape memory effect and brittleness	https://youtu.be/_nNuEiahuX4	
Comparison of different units	https://youtu.be/xEXyN_L5jfc	
From bi-stable to multiple stable, from pin jointed to 3D printed: controlled switching	https://youtu.be/jntpiFWhrdY	
2D to 3D via 3D printed multiple stable structures	https://youtu.be/Z4POqovFadI	
Multiple stable structure 20240413	https://youtu.be/d4rZpm7rH0c	
Stepwise shape recovery (5x5 units) 3 cycles	https://youtu.be/3sk1Re_vobA	

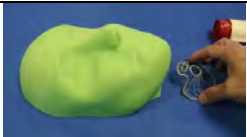
Controlled sequence 3x3	https://youtu.be/jiaSkMZ_lIU	
Controlled sequence 3x3 1/2-side constrained	https://youtu.be/hT80em3tmLo	
Controlled sequence in shape recovery	https://youtu.be/bpZg7ynvrS0	
3D printed 2D to 3D switchable bi-stable structure (proof-of-concept)	https://youtu.be/p01ERlvEGWs	
Bi-stable or slow recovery of FDM printed structures	https://youtu.be/7k_XQigDOJg	
Shape switching: from 2D to 3D (3D printed)	https://youtu.be/4-d-H56odwk	
Shape memory effect in 3D printed PLA structure	https://youtu.be/6GTiPIgtlbk	
2D to 3D switching in FDM printed structures	https://youtu.be/ospxo0ppH_o	
FDM printed structures: step-by-step shape switching	https://youtu.be/u48Ne_cSLi4	

Sequential shape switching: 2D/3D	https://youtu.be/-2kH-RerT-A	
3x3 array with cover, 1 cycle	https://youtu.be/IFVwLwthJu0	
3x3 w cover 3D view	https://youtu.be/izuFhk825f8	
Stepwise shape recovery 20250701	https://youtu.be/cqwBXQQAT2s	
Symmetric multiple stable structures with controlled shape recovery sequence	https://youtu.be/xC50TS-srv0	
FDM printed multiple stable structures	https://youtu.be/w4ZMhbZxOcI	
Mechano/heating-responsive stepwise shape recovery	https://youtu.be/f983RrmzB8s	
Shape memory structure 20250407a	https://youtu.be/j9Xldf55y5I	
Step-by-step shape recovery (20250428 3 cycles)	https://youtu.be/gr6Xvg-FnMw	

Step-by-step shape recovery 20250428 2 cycles 4x	https://youtu.be/HYQU4IJI40E	
Step-by-step shape recovery @room temperature	https://youtu.be/XtuwQgsB_Gw	
Step by step recovery 20250408	https://youtu.be/MR5cApX-J0k	
Sequentially programmed shape recovery in 3D printed structures	https://youtu.be/isONHD4xQ9w	
Influence of pre-cooling	https://youtu.be/jS80CtFn_pk	
Demonstration of assembly 20260118	https://youtu.be/7BO8YPg1ZXw	
Different recovery time	https://youtu.be/ULfG86TxfB8	
20 度 两个逐步恢复	https://youtu.be/f47KghbpMwU	
135 度 两个逐步恢复	https://youtu.be/WalKuvwgyB0	

三个逐步恢复	https://youtu.be/BauVLuKSIYk	
按黄老师图摆放恢复；三个	https://youtu.be/-IBqSk6TCck	
三个逐步恢复	https://youtu.be/dGUQp1A6000	
两个逐步恢复	https://youtu.be/EcidWWUag_I	
四个逐步恢复；第三版	https://youtu.be/i5eJxC3gtc	
四个逐步恢复；第二版	https://youtu.be/m6f7JaHlnMg	
四个逐步恢复	https://youtu.be/EsdMIEjIcng	
手多版：三个逐步恢复（一个动作）	https://youtu.be/-gKN_5DFBI0	
按压 7MIN	https://youtu.be/FpmQgdD-Ed0	
按压 5min	https://youtu.be/33neLCBdfII	
按压 3min	https://youtu.be/qAh75W35wUw	
按压 1min	https://youtu.be/KSgD9TbN_1M	

按压 45s	https://youtu.be/y9_vKuNhseY	
按压 35s	https://youtu.be/D4YatvQ3e88	
按压 25s	https://youtu.be/CxnxlS2c5D4	
按压 15s	https://youtu.be/Y11u40XqzMQ	
按压 5s	https://youtu.be/8xF_LWxC9o8	
Room-temperature water induced step-wise morphing	https://youtu.be/EOCiPbodGrQ	
Water-responsive stepwise recovery (3-unit 20260221A)	https://youtu.be/a6-wMCWxQJk	
3D printed mask holder for comfort fitting	https://youtu.be/fzK3Uu8tsy0	
4D printing: body temperature comfort fitting mask holder from 2D to 3D mask holder	https://youtu.be/rOh65A1oiBc	
3D printed thermochromic mask holder: testing of color change	https://youtu.be/EcAj0L4oQjo	
Comfort fitting mask holder (V20200707)	https://youtu.be/2zg-eMQBGZs	
Rapid comfort fitting mask holder: testing of recovery	https://youtu.be/PzB2Y35WTdI	

3D printed rapid comfort fitting shape memory mask holder (I)	https://youtu.be/RjPM4KkNdFw	
3D printed rapid comfort fitting shape memory mask holder (II)	https://youtu.be/Kz5g7jsssf4	
Comfort fitting wrist ring	https://youtu.be/Un_KdYK8Z84	
Comfort fitting invisible mask (concept)	https://youtu.be/JzP8cL92Ijg	
Comfort fitting invisible mask: approaches	https://youtu.be/HPsMK79dm7Y	
Comfort fitting invisible mask	https://youtu.be/ITrwN7Pr98	
My own mask for selfie	https://youtu.be/bYlEi0HOXRM	
Testing of N95 mask (20200822a)	https://youtu.be/b2J6ANQuSfI	
Fabric mask: sublimation printed with real face	https://youtu.be/jTpkgE5JTxm	

3D printed X47B with morphing wings V1
- Using nitinol to activate bistable structure

<https://youtu.be/FC8wK4GF07A>



Heating induced shape switching in bistable morphing wings
- Part of a part-time FYP project

<https://youtu.be/4H04P1hYsjs>



3D printed morphing wings

<https://youtu.be/CcH98hsIeHo>



3D printed multiple-stable compliant structures
(Jan 2016)

<https://youtu.be/M77TZd5AniA>



Programmed folding/unfolding of a 3D printed multiple-stable structure

- Folding/unfolding is fully repeatable and follows a predetermined sequence.
- No "programming" is required.

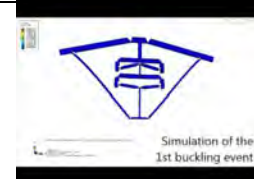
<https://youtu.be/Jkl-RyLNYuo>

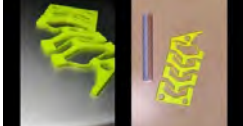


Programmed folding/unfolding of 3D printed multiple stable structure

- Comparison of simulation and experiment

<https://youtu.be/vMhkDGxLYCk>

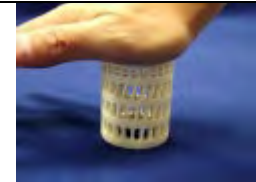


Comparison of different buckling modes in 3D printed multiple stable structures	https://youtu.be/WCqmpFpCbw	
Programmed reversible motion in a 3D printed compliant multi-stable structure	https://youtu.be/K71KdtXcJ1U	
Sequential folding/unfolding of 3D printed multiple stable compliant structure 20160903 - Testing result	https://youtu.be/7g7_x64uTFo	
Programmed folding/unfolding by design in 3D printed multiple stable compliant structures - Comparison of two designs	https://youtu.be/vyyO0DjCrQc	
Programmed folding/unfolding of 3D printed compliant structure Experimental vs. simulation	https://youtu.be/DM5fFFFEpaQ	
Programmed folding/unfolding of 3D printed structure with/without modification	https://youtu.be/SpQCxExQQDI	
Stepwise recovery at room temperature	https://youtu.be/rFpA70Qlsal	

3D printed structure for programmed folding/unfolding via twisting

- 20161024

<https://youtu.be/UdN3BzkzKEM>



3D printed structures with re-programmable motion sequence based on the SME

<https://youtu.be/XCX8EgFcAAE>



3D printed elastic mesh-ball with excellent shape memory effect (v01)

- First successful one.

<https://youtu.be/D8wgImUL6yM>



Shape memory effect in 3D printed elastic mesh ball (2nd version)

<https://youtu.be/bD1-zqHL7tw>



Pour in hot water to see shape recovery in 3D printed cup and spoon

- Cup and spoon have been pre-deformed.

<https://youtu.be/IIYjpQpmb9s>



SME in 3D printed items using PLA, VeroWhite and SF resin

<http://youtu.be/kquMHKthp5c>



Shape recovery in a 3D printed sculpture

https://youtu.be/5Yt2Fnm_c9c



3D printed morphing wheel 201602

<https://youtu.be/fiyEkzBfMig>



3D printed "products" 2017

<https://youtu.be/YEboRizQ0CU>



Testing of 3D print pen 20160810

<https://youtu.be/am4v1dMVry4>



Rapid fitting shoes: concept sketched by 3D print pen

<https://youtu.be/XpEfWnjgpoc>



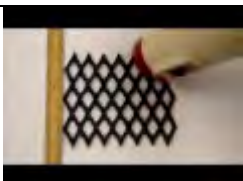
PU filament for 3D printing (characterization of SME)

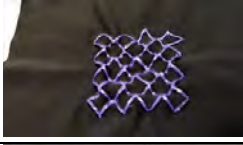
<https://youtu.be/b9S9SdQZQsI>

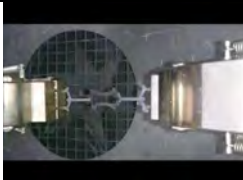
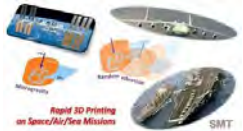


Shape memory polyurethane filament from Dr Hayashi	https://youtu.be/G3f8-lrAHjc	
Stretching of 3D printing polyurethane to fracture at room temperature - Including photoelasticity test in the early loading stage	https://youtu.be/RwELaEsZkHc	
Stretching of 3D printing polyurethane (zoom in view) - Photoelasticity	https://youtu.be/dJZjQfPIVaM	
Softening of DLP printed item after in room temperature water for one week (20211126)	https://youtu.be/6JEiExmlpXw	
Heating/water-responsive shape memory effect in DLP printed samples (Dec. 2021)	https://youtu.be/etpEA6_-Prs	
SME in 3D printed PU octopus	https://youtu.be/IRDA-Q-L_Tg	
3D printed PU cup (morphing)	https://youtu.be/jjAMJVNdTv8	

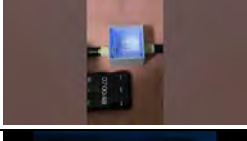
Testing shape memory effect in 3D printed PU octopus and cup - Filament: 1.75 mm shape memory PU	https://youtu.be/TYvecXTiG4Y	
3D printed shape memory flexible cup	https://youtu.be/BnDAYhNPAPc	
3D printed flexible chicken	https://youtu.be/oUeMeEAzm7g	
3D printed color change/shape morphing chicken I	https://youtu.be/e_p4pgOszwM	
3D printed color change/shape morphing chicken II	https://youtu.be/9Ho4FJutqYU	
Rapid reshape permanent shape of 3D printed shape memory PLA spring - Experimentally demonstrate how to use hair dryer to reshape the permanent shape.	https://youtu.be/NIdKrzfDpdw	

Rapid switching between tensile spring and compression spring - 3D printed spring, utilizing the shape memory effect	https://youtu.be/pZ7Sc3VqAsc	
Testing of the SME in a 3D printed elastic lattice structure	https://youtu.be/T6YhZkIAbxU	
Testing shape memory effect in 3D printed elastic grid	https://youtu.be/--bKkojmsps	
3D printed shape memory shoe - Most likely this is the 1st piece in the world.	https://youtu.be/Q_wu7VrXTNg	
3D printed shape memory sole	https://youtu.be/7G8QAIXBIU8	 3D printed shoe (top) and sole (bottom)
3D printed stretchable shape memory insole (retesting after modification)	https://youtu.be/TeiIhpBMt0M	

Fully 3D printed flexible shape memory shoe - Limited by the size of the printer, parts are printed and then assembled together.	https://youtu.be/-ZTwB1BgIpg	
3D printing assisted fashion design	https://youtu.be/040VxZzQUtA	
3D printing assisted fashion design 20230514	https://youtu.be/Vqd-cEw98c	
2D to 3D conversion via FDM printing atop pre-stretched textile	https://youtu.be/cxOBgnCuNcY	
3D printed atop pre-stretched spandex, followed by heating	https://youtu.be/L8_XDHEYRQM	
2D to 3D via 3D printing atop pre-stretched spandex followed by heating	https://youtu.be/eOJPSOqqU6k	
Formation of 3D structures via 3D printing atop prestretched elastic fabric	https://youtu.be/3rvulKkqj9Y	

Comparison of typical 3D printing filaments V. 20170525 - Elasticity, shape memory effect	https://youtu.be/UPpxfUCWsQk	
Testing the SME in TPE and polyester filaments	https://youtu.be/abCyhGQpNTM	
Testing units of 3D printed 2D structures using flexible filament - Positive and negative Poisson's ratio	https://youtu.be/DclvsnWSE48	
3D printed flexible shape memory grid (with negative Poisson's ratio)	https://youtu.be/m2eqSynG2P4	
Fabrication of cooling responsive shape memory hydrogels via FDM: preliminary result	https://youtu.be/q6ChJGjAbEk	
Anisotropic shape memory polymers: orientation dependent Tg	https://youtu.be/G_JVYOkM4ys	
Rapid 3D printing in solid state - For additive manufacturing on space/air/sea missions	https://youtu.be/eMMPvOwhUa0	

Rapid Volumetric additive manufacturing of cooling-responsive shape memory hydrogel in solid state Via dual-mask cross-linking in solid state Preliminary experimental result	https://youtu.be/_bVD_wg2jN4	
Rapid 3D printing in solid state: illustration via dual-mask	https://youtu.be/wgolzU_JMcY	
Animation of volumetric additive manufacturing in solid state	https://youtu.be/w5TRSDz8G24	
Rapid 3D printing in solid state: animation	https://youtu.be/gCrGrFqWCo4	
Digital manufacturing and 3D printing (animation)	https://youtu.be/pNLVZqZNE7c	
快速固态增材制造 202105	https://youtu.be/Bm6pSbLrFYI	
Rapid additive manufacturing in solid state 202105	https://youtu.be/p27Li1qcV6M	
Demonstration of UV cross-linking in solid state at room temperature of Vitrimer	https://youtu.be/0r3455sb8Lg	

UV cross linking in the solid state with random shaking	https://youtu.be/cWJvNXXRsoA	
Rapid UV cross-linking in the solid state under random vibration (full version)	https://youtu.be/X15o-a_XLMM	
Solid state dual UV beam X linking 20230418	https://youtu.be/Dg5j__mcc-A	
Solid state UV cross linking 20240618a	https://youtu.be/k3HCORVdfjw	
Solid-state UV cross-linking, a DIY way for sculptures	https://youtu.be/X16zsAcPnPA	
Heat in UV crosslinking of liquid/solid resins 20250211	https://youtu.be/_c_cSbtg_4	
Heat generated upon UV cross-linking: Esun UV resin+thermochromic crystal	https://youtu.be/PxTkuv3QIr0	
UV cross linking of solid resin	https://youtu.be/9WQAhF2P1w	

Hardcrafted sculptures (20241020)	https://youtu.be/-cV7ivDLwUE	
Solid state UV cross linking for rapid sculpting 20250630	https://youtu.be/iFbnG6uUVag	
DIY 2D foam sculpture via solid state UV cross-linking (20241022)	https://youtu.be/J9HPM8dpsK0	
DIY 3D foam sculpture via solid state UV cross-linking (20241018)	https://youtu.be/dy_c59v-BDs	
Solid state UV cross linking fabrication line (demo) 20260108	https://youtu.be/0hbhxzdVBuo	
Cost-effective and rapid 2D additive manufacturing	https://youtu.be/dFRFJyY59vM	
UV cross linking machine (202404)	https://youtu.be/K6-qUq4_WBo	
UV cross-linking machine: Operation	https://youtu.be/uTK5E2xwHFq	

In car 2D printing via solid state cross-linking	https://youtu.be/QczX2_Z_D4U	
Solid X: 随时随地快速高精度 3D 打印 (202407)	https://youtu.be/Qy0EoXePwXY	
Solid X: Pioneer in solid-state volumetric additive manufacturing	https://youtu.be/Qcq-7Z11D2k	
Solid state heating cross linking 20251017	https://youtu.be/tfDyX2Fj8tQ	
Smart manufacturing 20251223A	https://youtu.be/rCKUEy4dRIU	

Instruction

Operating Hot Chamber with Vibration system (the one in Mechanics of Materials Lab)	http://www.youtube.com/watch?v=sJmKkfPRknI	
Mold for sample preparation by hot compression	https://youtu.be/toZ9JF42zRk	

Fun

Marina Bay, Singapore
March 22, 2014

<http://youtu.be/YAj2Vb7JvuA>



Shredding waste plastics

<https://youtu.be/9wOu-EVImBI>



Brick made of waste plastic + concrete

<https://youtu.be/2jdwdq2bFXM>



Image

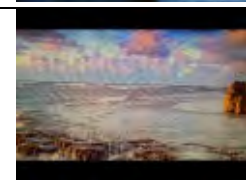
<http://youtu.be/6WEYrS93sZY>



Light interference: Monitor/mobile phone

https://youtu.be/_11FGBE1bTc

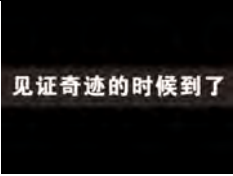
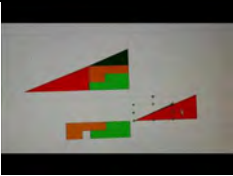
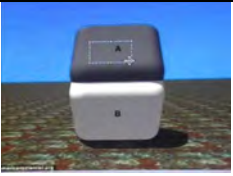
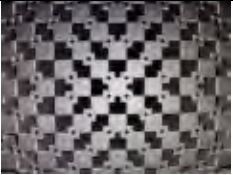
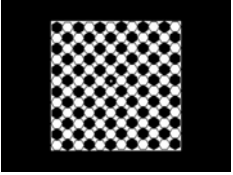
- The actual effect depends on the setup of screen and camera and many other facts.

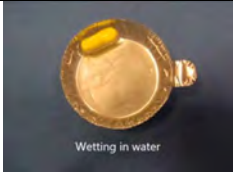


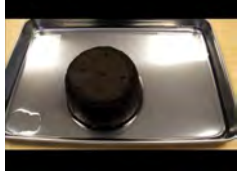
Interference in capturing image from screen using digital camera

<https://youtu.be/PbNEvHJR3sA>

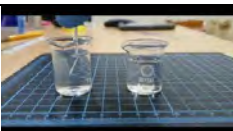
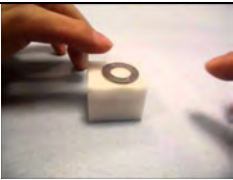


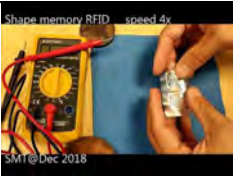
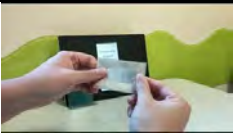
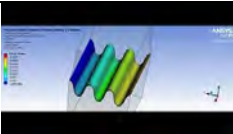
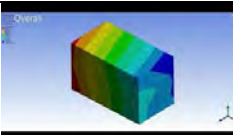
MP4011 (2013) Design course: video presentation	http://youtu.be/G2km8q20AT0	
- Video presentation of the designed products by individual groups. Nov 2013 Sem I@MAE/NTU		
扑克游戏	http://youtu.be/4v6jI283fTc	
- 见证奇迹		
Is it magic?	https://youtu.be/cT__HyK3u14	
How could this be possible?	https://youtu.be/Ewj8a83Ytsg	
Color vision	http://youtu.be/EzoJ8i1ktbk	
Size dependent visual effects	http://youtu.be/h6jTn6IOszU	
Illusion test I	https://youtu.be/vnn6Pl3FZYI	

Light interference	http://youtu.be/f8hNwy7UfHI	
Testing: projection by lens - Mirror image	https://youtu.be/wNP7eq3VwFg	
Heating 3D card (lenticular lens)	http://youtu.be/p6_gO5AGX6Q	
Sponge containing capsule	http://youtu.be/F3TrqR3pmBQ	
Water activated origami with controllable unfolding speed	https://youtu.be/kohbxgjG8j0	
Wetting of 3M biodegradable sponge	https://youtu.be/xjapgezRex4	

Wetting cleaning sponge 20170723	https://youtu.be/ibLuT4t0Dl0	
Wetting of artificial soil sponge	https://youtu.be/9edWi_on9FI	
Germination 20170908	https://youtu.be/c3Q2qnB8DNI	
Penetration of root into hydrogel	https://youtu.be/EJxiMsWWuDg	
Height adjustable high heel via mobile phone (mechanical design V1)	https://youtu.be/kD_1teNWHdc	
SMA activated height adjustable high heel	https://youtu.be/JbBzLD3VdTM	
Height adjustable high heel shoes (mechanical part)	https://youtu.be/4BVzP7SquY8	

Adjustable high heel 20210225	https://youtu.be/S5ES7_l7hF0	
Height adjustable high heel (missing SMA to activate)	https://youtu.be/ps7nHcocKbQ	
High heel shoes with height controlled by mobile phone (20210403)	https://www.youtube.com/watch?v=hgKE8ZT8vdc	
High heel shoes: illustration of height controlled by mobile phone	https://youtu.be/ncQyHaRC_wU	
Height rapidly adjustable high heel shoes 2021/2022 FYP	https://youtu.be/6y6NdbYiDYQ	
Height adjustable high heel shoe (1st piece of prototype, during presentation, behind-the-scenes)	https://youtu.be/visCRHw9rMs	
Rapid height switchable high heel shoes	https://youtube.com/shorts/i2KxENjyJFk	nil
Adjustable high heel 20260111a	https://youtu.be/CSQIx5RJpxk	

Characterization of memory foam	http://youtu.be/5mx15zKkVr8	
PU hardened in room temperature water in two minutes	http://youtu.be/OneEQWDoNuQ	
Rapid hardening in room temperature water	https://youtu.be/5ZccH80j6XI	
Rapid hardening of ethanol softened hard PU foam in room temperature water	https://youtu.be/lcnHmT4-EKM	
Electrospun two layered PU: rolling/twisting in ethanol and hardening in water	https://youtu.be/uLOBrkJLXE	
Electrospun 3D fibers with water hardening function for MIS	https://youtu.be/a8ZVoziy15Y	
Push to form a soft button	https://youtu.be/Nz3ZmpAKe1o	

Working mechanism of self-lock switch	https://youtu.be/QpTzAmSNUns	
Self lock on off button 20220129	https://youtu.be/N5c2AiP3lvs	
Shape memory RFID	https://youtu.be/CiFkE_Kew40	
Flexible/elastic shape memory RFID/NFC	https://youtu.be/DaF1ZDOg-1Y	
Beyond flexible shape memory RFID	https://youtu.be/2aTxNIyHOiM	
Elastic/stretchable embedded electronic devices: simulation	https://youtu.be/0u4Ad_F7w9k	
Stretchable electronics: simulation (20211231)	https://youtu.be/0znDsm5fx0Q	

Heat shrink tube (testing)	https://youtu.be/ssm_zkz4UK0	
Testing of heat shrink tube	https://youtu.be/iAxxRkYfpcs	
Testing of two water bottle wrap labels	https://youtu.be/5H5dx1Z5hPI	
Play with heat shrink film 20170720	https://youtu.be/hIKxuxIJ5wU	
Structural coloring in DVD disk, insect and nano-imprinted PMMA film	https://youtu.be/T_xlBbx4ui0	
Strutural coloring in butterfly's wings	https://youtu.be/3Jm7TvhC8dc	
模型补土炫彩效果 20250214a	https://youtu.be/w72UgZTf4Dg	

Mechanochromic tests

- Photoelasticity
- LCD

https://youtu.be/Ltu2A_B7SD8



Void paper and laser anti-counterfeit paper

<https://youtu.be/rIaaCKMSx2c>



Testing of laminated label

<https://youtu.be/djCsGaB4ZmU>



Testing of a packaging tape

<https://youtu.be/Alwwd1LJxhY>



Can your money shrink?

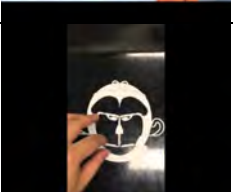
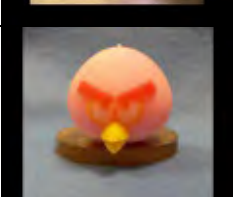
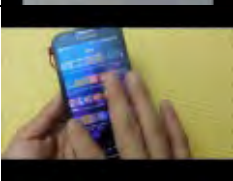
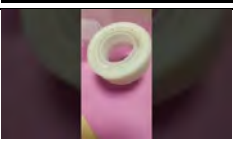
<http://youtu.be/MmHuJEbWVvk>



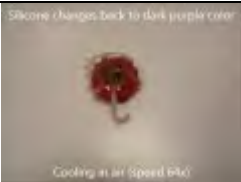
How does money shrink?

<https://youtu.be/A2Vdyvt8y9g>



Happy monkey year - 3D printed "monkey" with color change and shape change functions	https://youtu.be/wsbUab_tGI8	
Happy monkey year (monkey face) - 3D printed bistable compliant mechanism	https://youtu.be/vz1IdpvxHfA	
Shape switching of 3D printed car logos	https://youtu.be/tYB1XCUNe9U	
3D printed Angry Bird (by SUTD)	https://youtu.be/IEO1jdvIYPE	
Transparent touch-sensitive cover	https://youtu.be/XKBiymexO2Q	
See through upon stretching	https://youtu.be/03bFkSTqI_A	
雾化透镜	https://youtu.be/ZKUWPaBxy6A	

滴水防伪 1	https://youtu.be/O_4YqIssG-0	
滴水防伪 2	https://youtu.be/6LQznPwripG	
Shoes, shoes 20160220 - A collection of some "new" shoes	https://youtu.be/-TBYJ9AlefU	
A collection of cups 201602	https://youtu.be/mAPmFovT9_U	
Chinese study - Good luck	https://youtu.be/YiVOxkTuxGo	
关于颜色的问题 还记得「蓝黑裙」之争吗？最近社交网络上又为颜色问题争个面红耳热，今次的主角是一件外套。。。。	https://youtu.be/MzYMb9icpZQ	
Size effect (panda)	https://youtu.be/-tqh78mScJE	
Vision test		

TPU and color change PLA/silicone	https://youtu.be/n_eXTiyzR_Y	 Silicone changes back to dark purple color Cooling in air (Speed 80x)
Glue and styrofoam	https://youtu.be/lQfIIYrYcko	
Dissolving of styrofoam in acetone and superglue - Real time video	https://youtu.be/iyDYrP2S4lM	
One moment as an artist	https://youtu.be/9mnlt3uRGFA	
Testing of Styrofoam - Dissolving in acetone and subsequent heating-responsive SME	https://youtu.be/6R_puSo6lig	 Dissolving in acetone
Water "dissolvable" packaging sponge	https://youtu.be/UQmGOANxyPY	
Boiling water pouring into water bottle	https://youtu.be/BP5Gw1MyS7E	

Sculpture: heat to appear

<https://youtu.be/yx0AjZrPKXk>



Testing of optical property of inner membrane of old i-phone

https://youtu.be/BRTToX_n2JuE



我和美女有个约会

<https://youtu.be/7BR28OcYysw>



Scotchgard vs. silicone

<https://youtu.be/XzWvu5huXtY>

-Rapid reaction



Scotchgard vs elastic shape memory hybrid

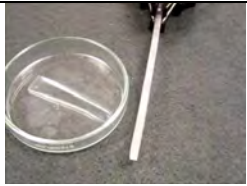
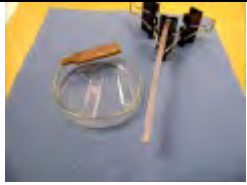
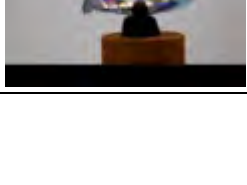
https://youtu.be/hInUDPfH_Y4



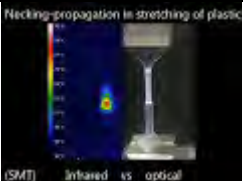
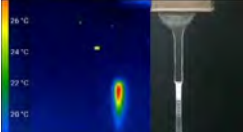
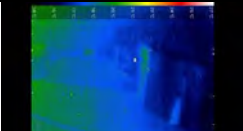
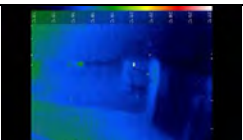
Size effect of silicone and its composite in response to scotchgard

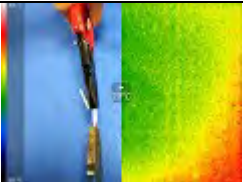
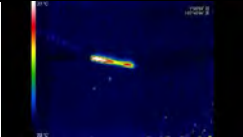
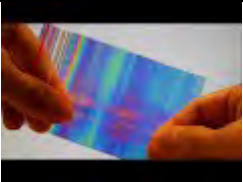
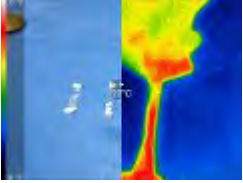
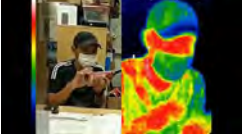
<https://youtu.be/fl3UGTTiP8I>



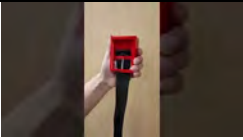
Silicone in response to acetone (one side wetting)	https://youtu.be/d7LH5soyRW8	
Silicone in response to Scotchgard (one side wetting) - Including its composite	https://youtu.be/JJiUf84V5AQ	
Insect? live? - New species of insect?	https://youtu.be/YJHeTmStObg	
Magic paper: hates hot water	https://youtu.be/HfoM9XTVc8k	
How to make reversible blossoms?	https://youtu.be/o1Y8YPeFAbI	
Reversible blossoms based on heating-induced shape change effect - Material: polymeric membrane	https://youtu.be/3xxsKufX3BI	
Heat-induced reversible blossoms (polarized light/lens) - Based on the heating-responsive shape change effect in polymeric membrane	https://youtu.be/PZtQS4-UzkU	

Heating induced shape change effect in wrap paper	https://youtu.be/dr5WI1OIajI	
Photoelasticity test of stretching plastic samples with different width	https://youtu.be/V6huA3TPFA4	
Fixing fractured USB cable - Comparison with using Sugru	https://youtu.be/Adq24GR44a0	
Non-fractured USB data cable	https://youtu.be/0by-dBOFV0A	
Shape memory lead - Proof of concept	https://youtu.be/6zF5OXaAhKM	
Brittle to ductile transition of PMMA (acrylic) via high temperature stretching	https://youtu.be/-LKYThFPcAk	

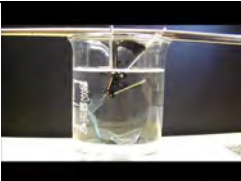
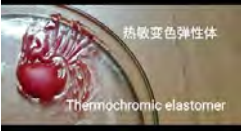
Necking and propagation in polymeric material upon stretching	https://youtu.be/S7FDqh_1QmM	
Necking-propagation in stretching of polymer - Room temperature stretching, optical vs. infrared videos.	https://youtu.be/W8L7Pnjc1aQ	
Patterned coloring via stretching - A new technique for coloring	https://youtu.be/6bomc5MD4TI	
Patterned coloring (opacity) via stretching: infrared vs. optical videos	https://youtu.be/FvuM48sgIA4	
Silver streak and stress whitening	https://youtu.be/U_I8Sh7I4AA	
PVC stretching at variable strain rate (infrared)	https://youtu.be/M2gcL37Eu-k	
PVC stretching at variable speed (single direction movement, infrared video)	https://youtu.be/4-sLCnA9sDY	

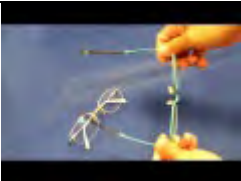
Stress induced crystallization in TPU observed by optical and infrared lens - Monitoring temperature increase during necking and propagation	https://youtu.be/enwi4VyJN_E	
Stretching of vitrimer polyurethane (normal and infrared lens)	https://youtu.be/Nk0ysqJXBfM	
Photoelasticity and infrared videos of stretching partially crystallized polyurethane	https://youtu.be/HOnCY404u_s	
Testing (photoelasticity) of plastic bag	https://youtu.be/gnueK8lKn7Y	
Photo-elasticity in heating of pre-stretched plastic membrane	https://youtu.be/hP8QvS2rOBI	
Comparison of plastic wrapper and TPU in stretching (polarized, optical and infrared)	https://youtu.be/l7aLJgfzk_k	
Seek thermal: testing	https://youtu.be/qhgddFbsFzc	

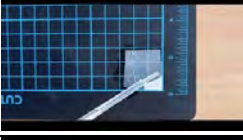
Water-content dependent photo-elasticity in tough hydrogel	https://youtu.be/OLIJULjiTU	
Rapid swelling of hydrogel	https://youtu.be/vulWlQco454	
Acrylic (PMMA): after in ethanol for years	https://youtu.be/tv2U06gDXDk	
Toy based on Moire effect - Light activated and pinching activated (to avoid misuse)	https://youtu.be/Qmmk3E9drC8	
Wrinkling in elastic leg support	https://youtu.be/MGyCdjpVqvg	
Buckling of bandage	https://youtu.be/ZmzGfHoraEs	
Goggles: from blur to clear, a piece of tape away	https://youtu.be/9INSd_wbADI	

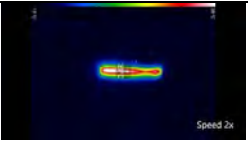
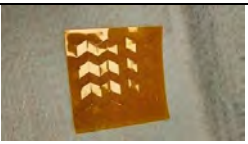
Repellent surface of moss	https://youtu.be/WypMeAc2H7c	
Elastic shear thickening material	https://youtu.be/di9bZx55Zlc	
Testing shear thickening material with a hammer	https://youtu.be/3GqIXoL2COQ	
Shear thinning vs shear thickening	https://youtu.be/Wb9aYiqd0hI	
Smash corn starch + water	https://youtu.be/MM3VjDwWk_0	
Seat belt (latch part) modified with shear thickening material	https://youtu.be/xt8aznoSi_Q	
Shear thickening for seat belt	https://youtu.be/JsxioeVNICY	
Testing of a shear thickening material	https://youtu.be/HwnjagQZrto	

Self-healing of shear-thickening material	https://youtu.be/jtyUIkuMrH8	
Shear thickening thermoset	https://youtu.be/WyFAnf7xeLw	
Testing of high temperature shear-thickening material	https://youtu.be/xFi_kdMiFmo	
Transparent shear-thickening hydrogel	https://youtu.be/FDnx4rvI8LA	
Water-responsive SME in uncross linked hydrogel	https://youtu.be/qKWvID0yLIU	
Wet hydrogel has the shear-thickening effect, refer to https://www.youtube.com/watch?v=FDnx4rvI8LA After drying, it has both heating and water-responsive SME. This video is to demonstrate the latter.		
Heating-responsive uncross linked hydrogel	https://youtu.be/we1K9F5C_Ck	
Refer to https://www.youtube.com/watch?v=qKWvID0yLIU&t=56s for water-responsive SMT		

Water activated SME in dry hydrogel - Borax+gule+water for the hydrogel used in this study	https://youtu.be/j7SNPjbkAtM	
硅胶+TPU 样品制作 搅拌流程	https://youtu.be/TFFGFro8CqY	
Heating/cooling in air TPU embedded with thermochromic PLA filament - Real time video	https://youtu.be/IO-dSEh_rQ8	
Thermochromic elastomer	https://youtu.be/RRP8Hs15Ga8	
Thermochromic elastomer short version	https://youtu.be/NN7lA2vqhpg	
Thermochromic materials: reversible/irreversible	https://youtu.be/qMyjk-JcVxg	
Applications of thermochromic materials: temperature indicator and anti-counterfeit label	https://youtu.be/rVeymJ2TLsM	

Comparison of two elastic glasses frames: NiTi shape memory alloy and PEI	https://youtu.be/4852pRtpFg	
DIY 的上课三件套	https://youtu.be/Q1lpCAniW1I	 DIY的三件套：导电笔，白导电，白导电
Thermal ring	https://youtu.be/cI85hNETrMU	
UV activated reversible photochrome: comparison of painting and film, and response speed	https://youtu.be/kJ25b_DLm88	
Reshapable and removable “hyaluronic acid” for wrinkle removal: proof of concept	https://youtu.be/u2vsF2aFGvc	 New shape fixed (新形状固定)
Electro-spinning	https://youtu.be/uspeZkGXYQA	
Electrospinning (zoom-in view)电纺	https://youtu.be/Iybm8pjhp-E	

Electrospinning 电纺	https://youtu.be/WOxI5t8hq-I	
Comparison of swab/ethanol induced recovery in electrospun PU	https://youtu.be/xbADfqzuVGg	
Wetting by ethanol: two layered PU	https://youtu.be/XGKGIlhHwH DU	
Shape recovery induced shrinkage (simulation)	https://youtu.be/VfpyMB6CN3k	
Shape recovery induced shrinkage in electrospun fiber (buckling stage)	https://youtu.be/L33FJM0QC4c	
Automatic braiding machine	https://youtu.be/qMF2q9QnBz4	
Lacis Cord Maker	https://youtu.be/55XBFu4Koyg	
Laser engraving	https://youtu.be/ZIeH1k-NZSg	

Joule heating LIG	https://youtu.be/WQuzKfCCz-M	
Laser induced graphene (LIG)	https://youtu.be/eDH3SlkDOfs	
Laser engraving	https://youtube.com/shorts/KByqKRqaEwE	
4D Latte Art		
Kueh FanSi Recipe	https://youtu.be/o0Ry2lfv4WI	
Unfolding of latte art membrane atop hot water	https://youtu.be/Ek3XRwBk7pI	
	4D 拉花	
Unfolding of latte art: comparison of using cold water and hot water	https://youtu.be/7G9HhmxccXk	
	4D 拉花	

4D latte art: unfolding atop of water

<https://youtu.be/wlz5QHPooy8>

4D 拉花



4D latte art: testing of printing
- Using selfie coffee printer

https://youtu.be/r-EuVAO_wik

4D 拉花



4D Latte Art: testing of industrial food printer
- QR code can be read

https://youtu.be/qyAfbX1N2_Q

4D 拉花



4D latte art: right on the way
- Examining the quality of food printing on latte art film

<https://youtu.be/-vfeXRQkNOQ>

4D 拉花



4D latte art: fly atop water

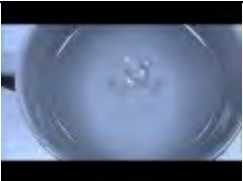
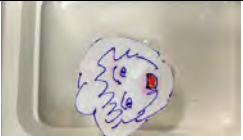
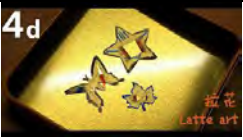
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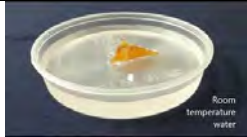


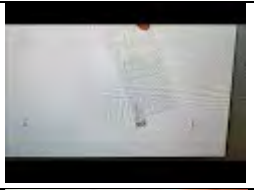
4D 拉花 Latte Art (V20191101)

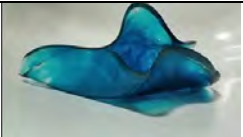
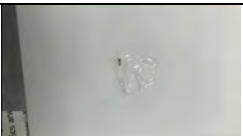
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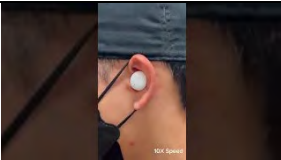
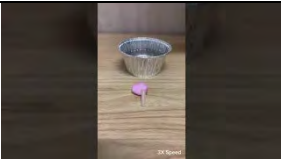
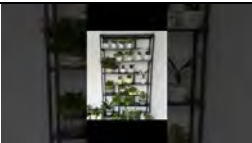
4D latte art/拉花: Flowers open (花开放)	https://youtu.be/tzUjErYE9ds	
Murder in mug: 4D latte art	https://youtu.be/MlIWKyGebu8	
4D latte art: testing of concepts (20200107)	https://youtu.be/C0cwBxi58SM	
4D latte art: testing of concepts (short/music version)	https://youtu.be/NKxXjfHKYWQ	
4D Latte art (20200114A)	https://youtu.be/7sBqxeyqoc8	
4D latte art: from concept to real food	https://youtu.be/D4cvsesqrVs	
Water-responsive shape memory effect	https://youtu.be/PmgB8hCeRn8	
Latte art 20191204a	https://youtu.be/GKOePoe4AEE	

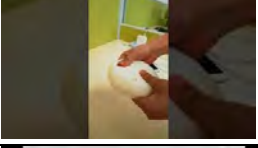
Endless spinning	https://youtu.be/WUdp5fHmN3Q	
Spinning 4D latte art	https://youtu.be/qwSU5WUZMzk	
4D latte art: cw/ccw spinnin +unfolding	https://youtu.be/FFeZqV9Vz0w	
4D latte art (updated on 20210429)	https://youtu.be/V6-KiKq1dHc	
(4D latte art) 驿动的心：动还是不动	https://youtu.be/uKoAtdZ9Pcw	
4D latte art: rotation in duet dance	https://youtu.be/r1YZRh5McWc	
4D latte art (20210726)	https://youtu.be/MAIz4jmIgVI	
4D latte art (20210811)	https://youtu.be/GHFYSpteJUg	

Latte art: folding/unfolding (triangle)	https://youtu.be/Q2hBD7xcZRg	
4D latte art (20220421): including forming dome shape	https://youtu.be/_VE2QiQSQUw	
Drawing atop food grade membrane by laser engraving	https://youtu.be/1oWeUehXF8I	
4D latte art (simulation)	https://youtu.be/RqOzv5C76Go	
Coloring in front of monitor	https://youtu.be/K8GOqdy9ljQ	
Coloring in front of monitor - Rotating a piece of thin film atop monitor to show pattern/color change	https://youtu.be/WPEOcSRUVVc	
Structural coloring - Powder in PDMS (after curing, after mixing)	https://youtu.be/Z8gUG9G3laU	

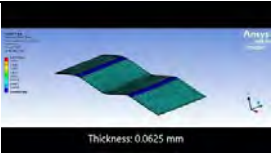
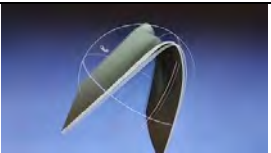
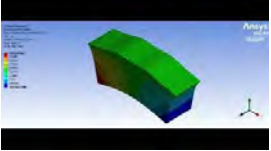
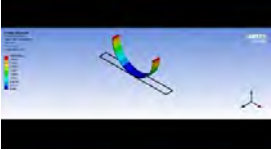
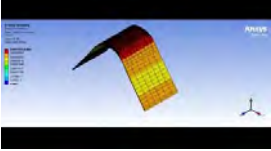
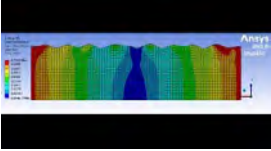
自制口罩扣松紧器	https://youtu.be/9MSlsFUd4TY	
Influence of cross linking on polymers	https://youtu.be/42pwEVgCn6g	
Glass transition temperature	https://youtu.be/5X22REhzKAs	
Unlock your phone without your finger: skin-like material to replicate exact finger print	https://youtu.be/4ABFVLgt4WM	
Unlocking using rapidly duplicated 3D finger print (用快速复制的 3D 指纹解码)	https://youtu.be/cqYWx6JsJXQ	
Alcohol activated self-tightening band aid		
Alcohol induced rapid shrinkage	https://youtu.be/0yHsZSbvgoo	
Skin cleaning alcohol activated self-tightening band aid (i): proof-of-concept	https://youtu.be/33DCKJY_VSk	

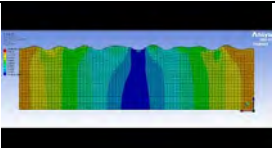
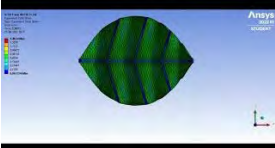
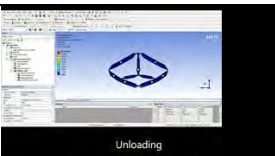
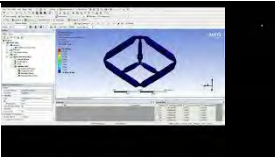
Skin cleaning alcohol activated self-tightening band aid (ii): chicken leg test	https://youtu.be/-2IUBOSw17A	
Skin cleaning alcohol activated self-tightening band aid (iii): water proof test	https://youtu.be/K38jEsVZ644	
Skin cleaning alcohol activated self-tightening band aid (iv): one-day human test	https://youtu.be/EtyL8uOHDIA	
Alcohol gel activated shrinkage in band aid	https://youtu.be/xlevSfRTPPw	
Fitting		
Rapidly & accurately capture inner ear canal shape	https://youtu.be/ashKnLKm0b4	
Fitting using Solidworks	https://youtu.be/x4oAjGALrdM	
DIY customized earphone: proof-of-concept	https://youtu.be/lwJJyEuKyAI	

Comfort fitting ear phones: Type I	https://youtu.be/Lg8ELg5-mdA	
Comfort fitting ear phones: Type II	https://youtu.be/dCcz8hEQWjg	
Vertical gardening		
Vertical gardening: green wall using high strength/low density artificial soil sponge	https://youtu.be/4n6_mSwo7SM	
Vertical gardening using artificial soil foam	https://youtu.be/DHbBn_th-mo	
New artificial soil:新型仿土海绵	https://youtube.com/shorts/1pqmw_1MDk8	
Foam soil (20221016)	https://youtu.be/VMFpqmEt_Bc	
采用新一代基质的盆景：即将淘宝上市	https://youtu.be/5Fs53MjKM6Q	

A new generation of artificial soil 20221203	https://youtu.be/kGWWG62SCwYg	
Vertical greening wall panel	https://youtu.be/gL789fQo_P4	
Comparison of a few types of artificial soil 几款仿土海绵对比（长期试验）	https://youtu.be/GkJwA1KHq10	
Highly elastic artificial foam soil (高弹性仿土海绵)	https://youtube.com/shorts/h6juUD-RaLc	
Soilless Bonsai 202301	https://youtu.be/CJEajungF34	
新一代仿土基质：4Mgrow(植穰) 20231011	https://youtu.be/RYWGW5ApWKo	
4mGro(4m 植穰)操作演示	https://youtu.be/LyEj4W2Yc-E	

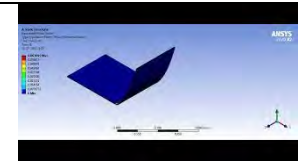
手工制备彩色仿土基质	https://youtu.be/o_41w4wo8cw	
径下村仿土绿墙项目（20240322）	https://youtu.be/bE47SSwD3fM	
Water on-demand irrigation system for vertical gardening	https://youtu.be/_jL0Ha8B0EA	
Colored artificial soil with custom printed patterns on the surface	https://youtu.be/56zYFaocM2o	
4mGro: Colorful artificial soil/Office bonsai 20241118	https://youtu.be/OHmm8GVypw4	
Desktop hydrogel small bonsai	https://youtu.be/KqCAFJE_s_Y	
Green Wall system 20250210	https://youtu.be/DByjaYqb80s	

FEM simulation of shape memory effect: Zigzag pattern	https://youtu.be/JJnArOm86kU	
Ansys simulation of 2D to 3D	https://youtu.be/YvcjA_JSHVg	
Ansys simulation: 2D to 3D (3D view of resulted structure)	https://youtu.be/3aU8FbsmbiQ	
Combination of bending and wrinkling	https://youtu.be/IVvK8EsnE04	
Simulation of starch membrane wetting from bottom	https://youtu.be/S5Wg7oEce4E	
Simulation of water droplet placed atop dry hydrogel	https://youtu.be/ABXAR-PExsE	
Wrinkle pattern switching in thin elastic membrane atop soft substrate upon compression	https://youtu.be/xX4yp-waUnM	

Wrinkling and pattern switching upon compression (Simulation II)	https://youtu.be/gDJvPdwsavl	
2 ways of shrinkage fun	https://youtu.be/FhxunIAJeJU	
Simulation of leaves	https://youtu.be/ymR-4TvPxuk	
SME in bistable structure	https://youtu.be/w949mo_abec	
Simulation of room temperature bending and then heating for shape recovery	https://youtu.be/ZNGJfExDwBU	
Simulation of twisting at room temperature and then heating for shape recovery	https://youtu.be/0_bW-0xkSZo	
Simulation of SME (room temperature programming using softening model)	https://youtu.be/992y_csKR58	

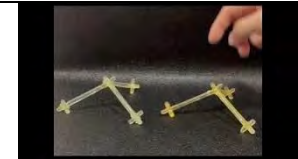
Thermo-responsive shape memory effect (room Temp. bending) [expansion/shrinkage model]

<https://youtu.be/BDUKznE11Cs>



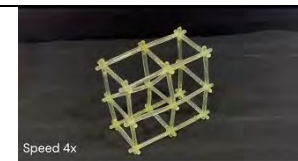
Recovery: from rapid to slow (20260108)

<https://youtu.be/aYJaOT8gUVI>



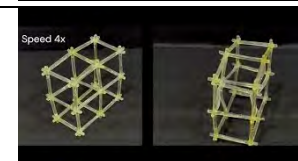
Slow recovery of viscoelastic grid 20260108

https://youtu.be/2_oBZ6Wfsdo



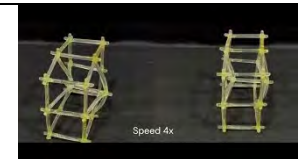
Slow recovery in viscoelastic grid (I)

<https://youtu.be/FDG54Sziiqq>



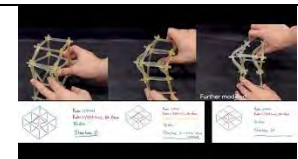
Slow recovery of viscoelastic grid (II)

<https://youtu.be/GI-fRWyNQ4c>



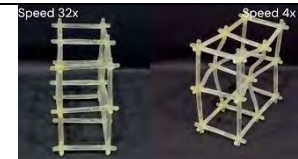
Viscoelastic material based slow recovery structures

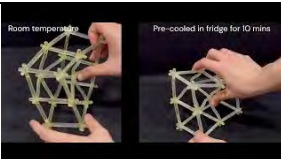
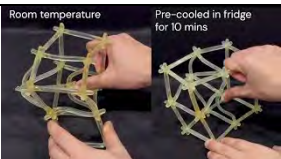
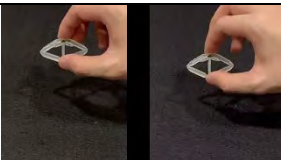
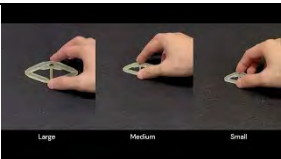
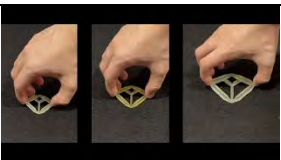
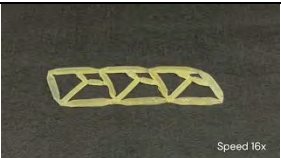
<https://youtu.be/3e38XXImMq0>



Slow recovery of viscoelastic grid after cooled in fridge [1.05]

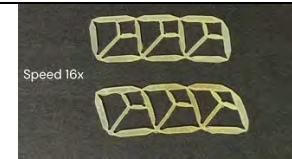
<https://youtu.be/Pa99ORCDheM>



Slow recovery of viscoelastic grid after cooled in fridge [1.15]	https://youtu.be/YuW_Zi7Oeq4	
Shape recovery of viscoelastic grid w/wo precooling (1.05)	https://youtu.be/XQP2hclDpEo	
Shape recovery of viscoelastic grid w/wo precooling (1.15)	https://youtu.be/gSgcrtRAX54	
Different holding time (small 1st shape room temp 4x)	https://youtu.be/33uvwC1DyEY	
1st shape room temp 10x A	https://youtu.be/4fQxO5ehF3A	
2nd shape room temp 10x	https://youtu.be/O-pcxMZdEkc	
1x3 viscoelastic room temp	https://youtu.be/k9AKhvtv68	

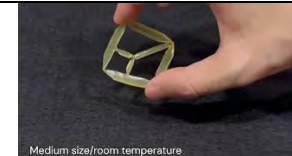
Compressed by 10 s (20260214 A)

<https://youtu.be/kl8lWsyF0Y>



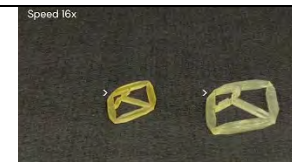
Medium size, room temperature recovery

<https://youtu.be/yGGiON1-czA>



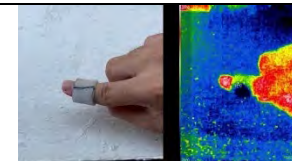
Medium size vs large size, room temperature recovery

<https://youtu.be/GbhdKregGqw>



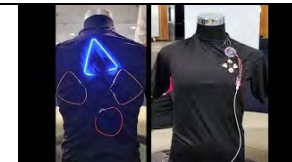
Powerless cooling 20250508

<https://youtu.be/DMtHXbICa64>



Cycling jersey with directional indicators

https://youtu.be/YkZwXM_VIUM



BlinkTurn 20250716

<https://youtu.be/Xednsfer5JE>



Dislocation at um scale?

<https://youtu.be/N7jKh2xZi-A>

