

Supporting Information

Solution-processed 2D materials on paper substrates for photodetection and photomechanical applications

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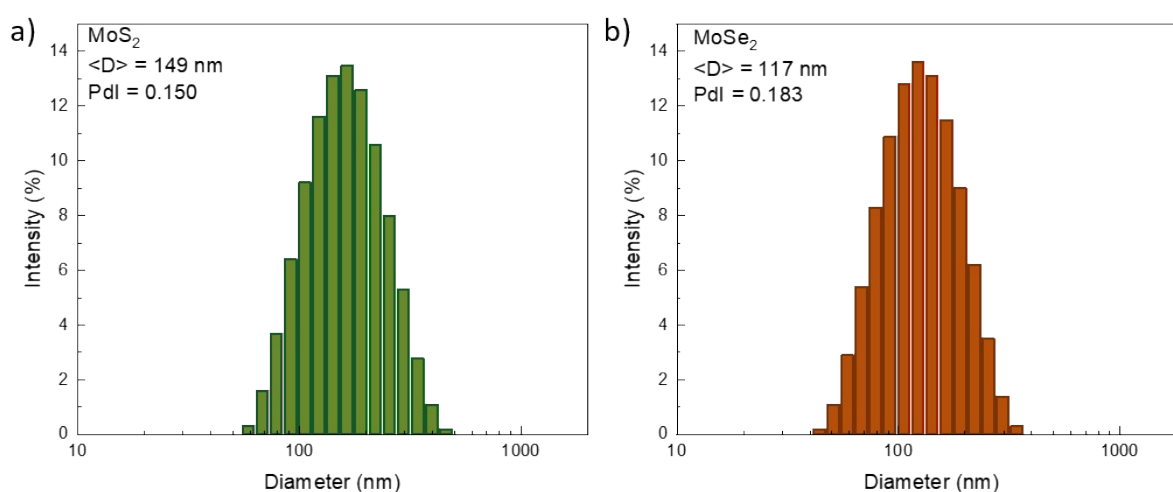


Figure S1. Nanosheet size determination for (a) MoS₂ and (b) MoSe₂ using dynamic light scattering.

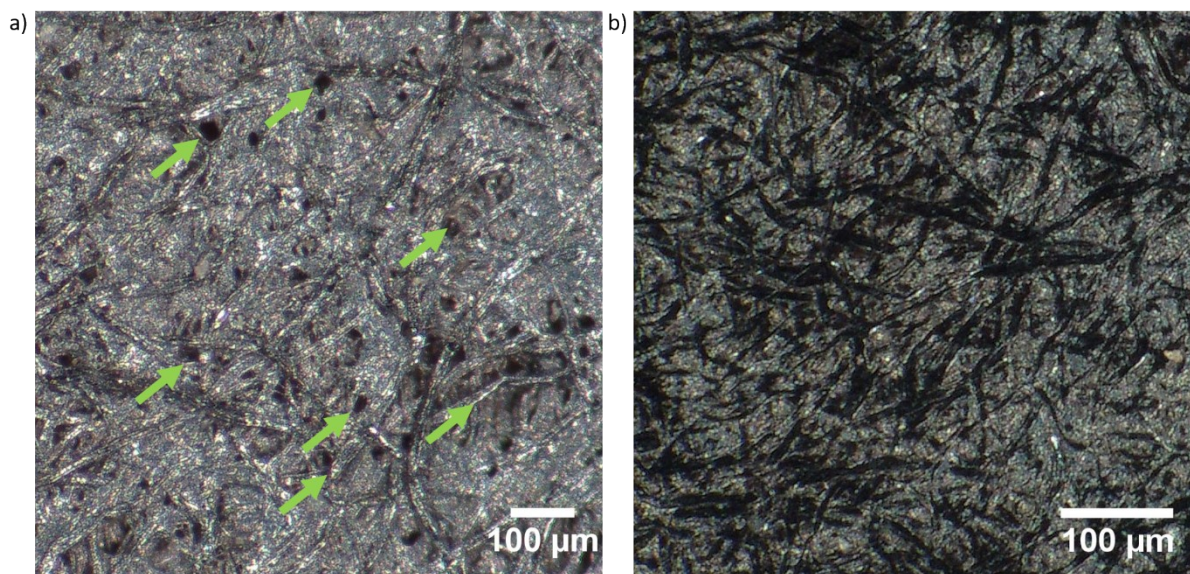


Figure S2. Optical micrograph of the 2D material coated papers (a) before and (b) after calendaring. Voids are highlighted in (a) with arrows.

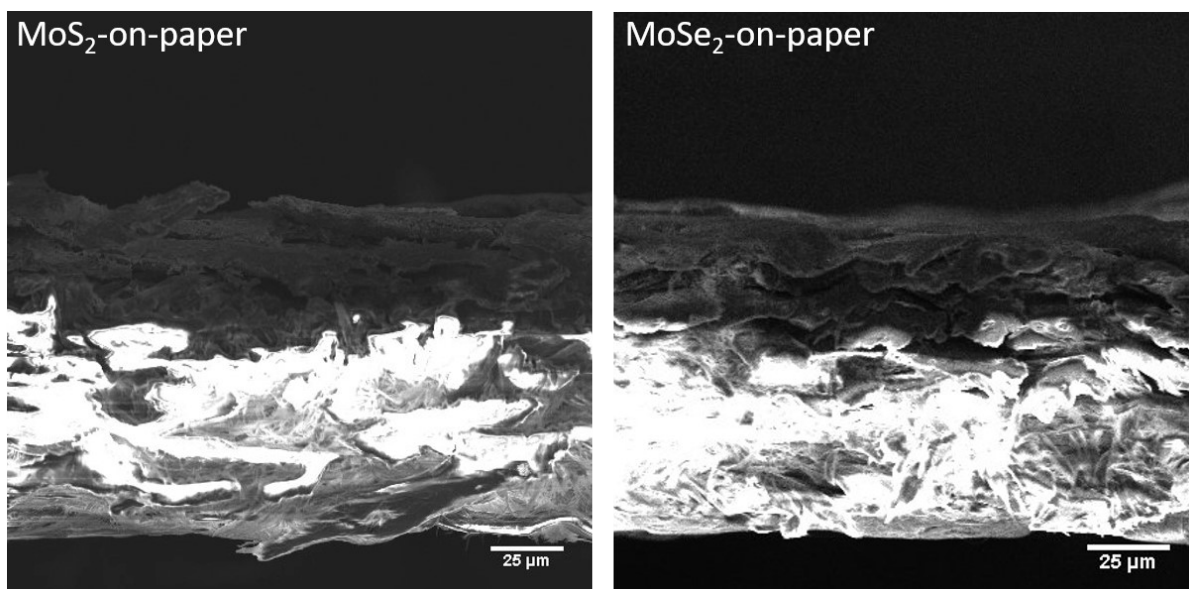


Figure S3. Cross-sectional FESEM images of MoS₂ and MoSe₂ coated paper after calendaring.

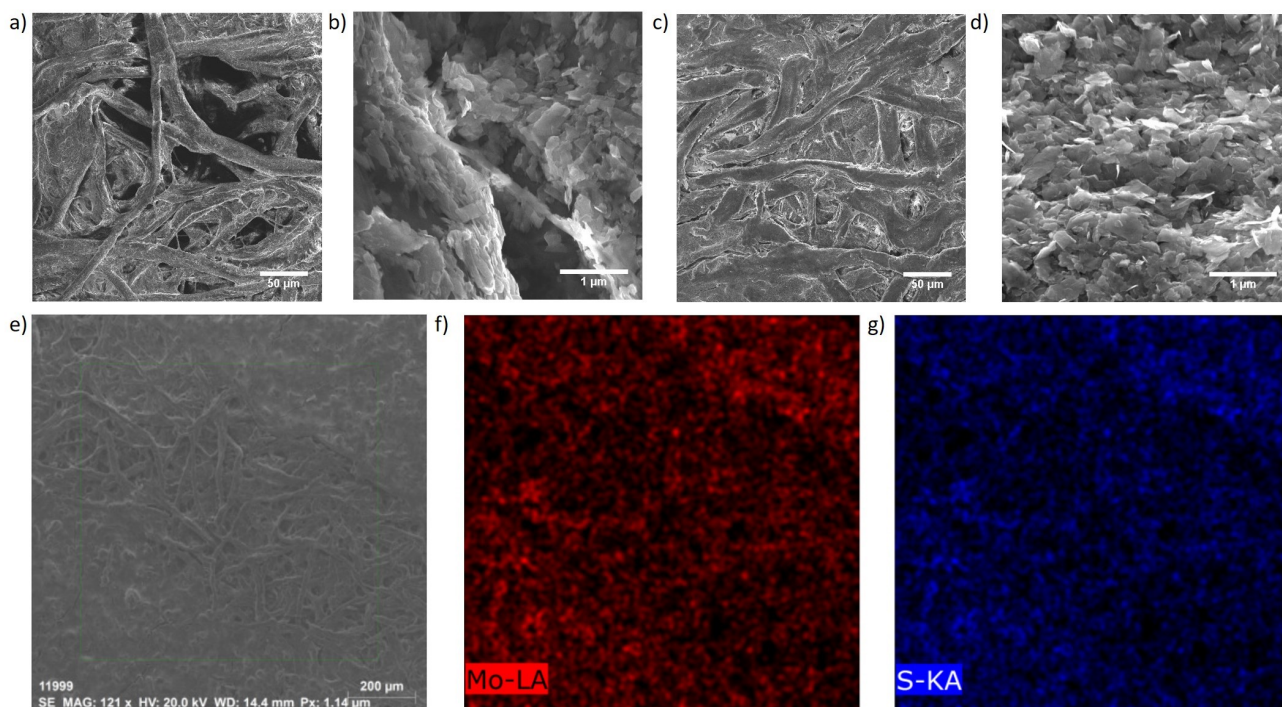


Figure S4. FESEM image of MoS₂ coated cellulose paper (a and b) before, and (c and d) after calendaring, with (e-g) corresponding elemental maps.

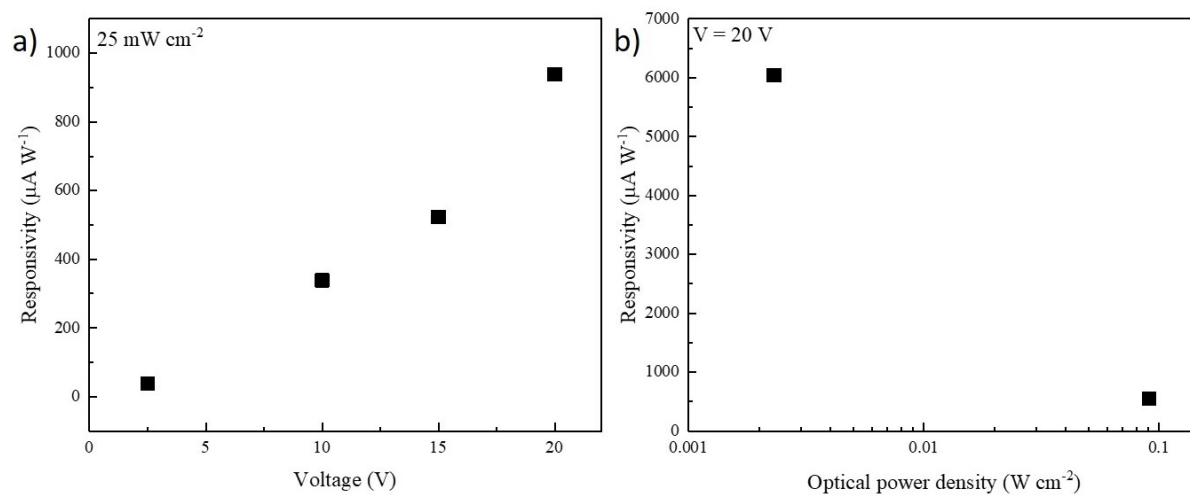


Figure S5. Responsivity as a function of bias voltage and incident optical power.

S. No.	Description	Contact material	Responsivity (mA W ⁻¹)	Ref.
1	MoS ₂ (1T and 2H mixture) : MoO ₃ photodetectable paper	Inkjet printed PEDOT:PSS	0.134	1
2	Solution-processed MoS ₂ on glass substrates	Au top contact/ITO back contact	0.1	2
3	Inkjet-printed MoS ₂ on Si:SiO ₂	Ag	0.036	3
4	Liquid exfoliated MoS ₂ :WSe ₂	Pencil graphite	124	4
6	Hydrothermally grown MoS ₂ on cellulose paper + carbon quantum dots	Ag paste	18.12	5
7	Hydrothermally grown MoS ₂ on cellulose paper	Screen coated silver interdigital	290	6
8	Liquid exfoliated WSe ₂ on paper	Ag paste	17.78	7
9	Inkjet-printed MoS ₂ on paper	Inkjet-printed graphene	0.0005	8
10	Rubbing bulk MoS ₂ crystals onto paper	Pencil graphite	0.0016	9
13	Inkjet printed WS ₂	Screen + Inkjet-printed graphene	0.61	10
14	Liquid exfoliated WSe ₂ - + polyaniline	Ag paste	17.26	11
15	Inkjet printed MoS ₂	Inkjet printed graphene	>1	12
16	Spray coated MoS ₂ on cellulose paper	Screen-printed carbon ink	6	This Work

Table S1. Literature comparison of a few 2D material based photodetectors on paper.

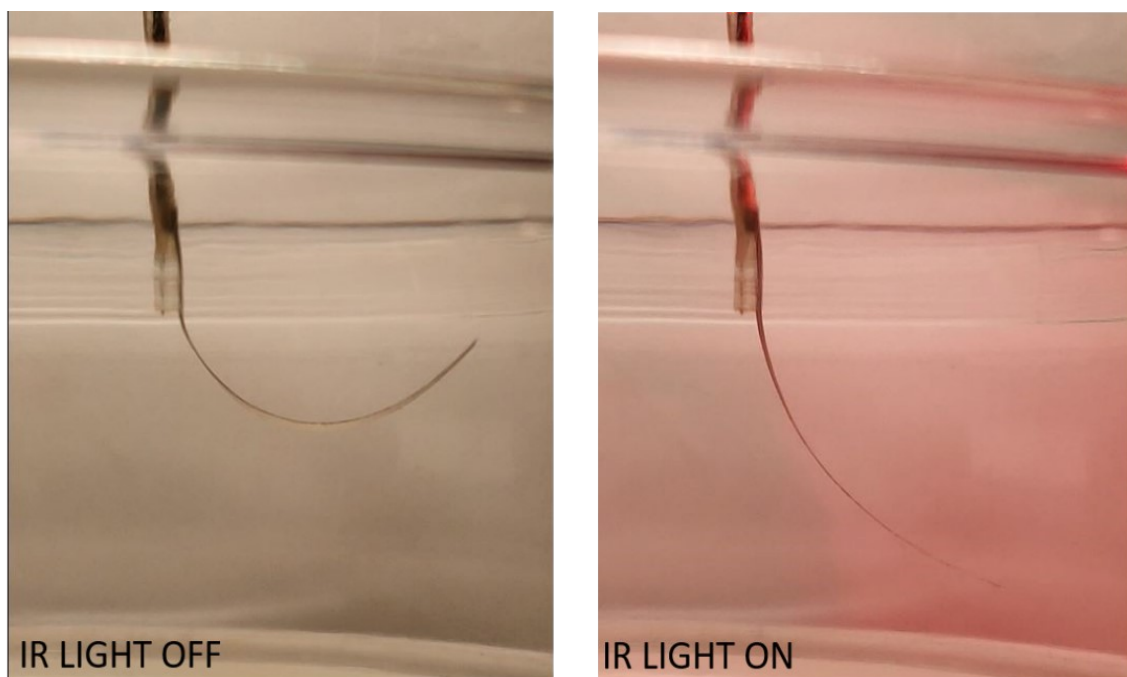


Figure S6. Actuation under vacuum.

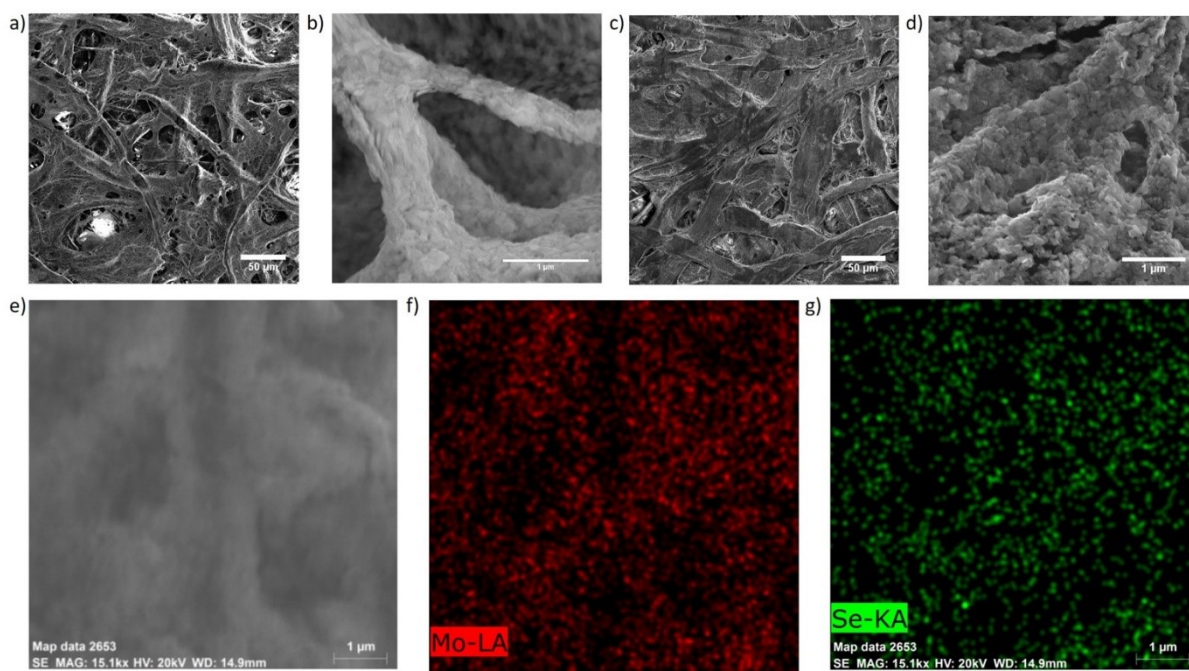


Figure S7. FESEM image of MoSe_2 coated cellulose paper (a and b) before, and after (c and d) calendaring, with (e-g) corresponding elemental maps.

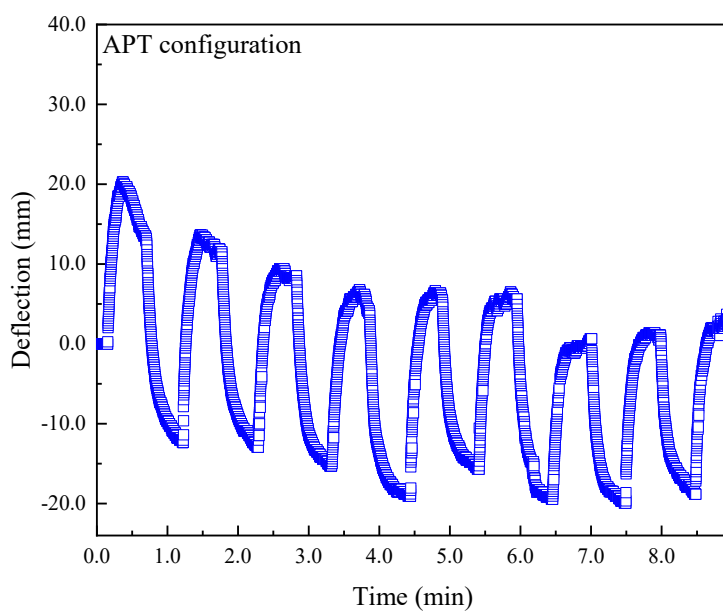


Figure S8. Cyclical stabilization of photothermal actuators after calendaring.

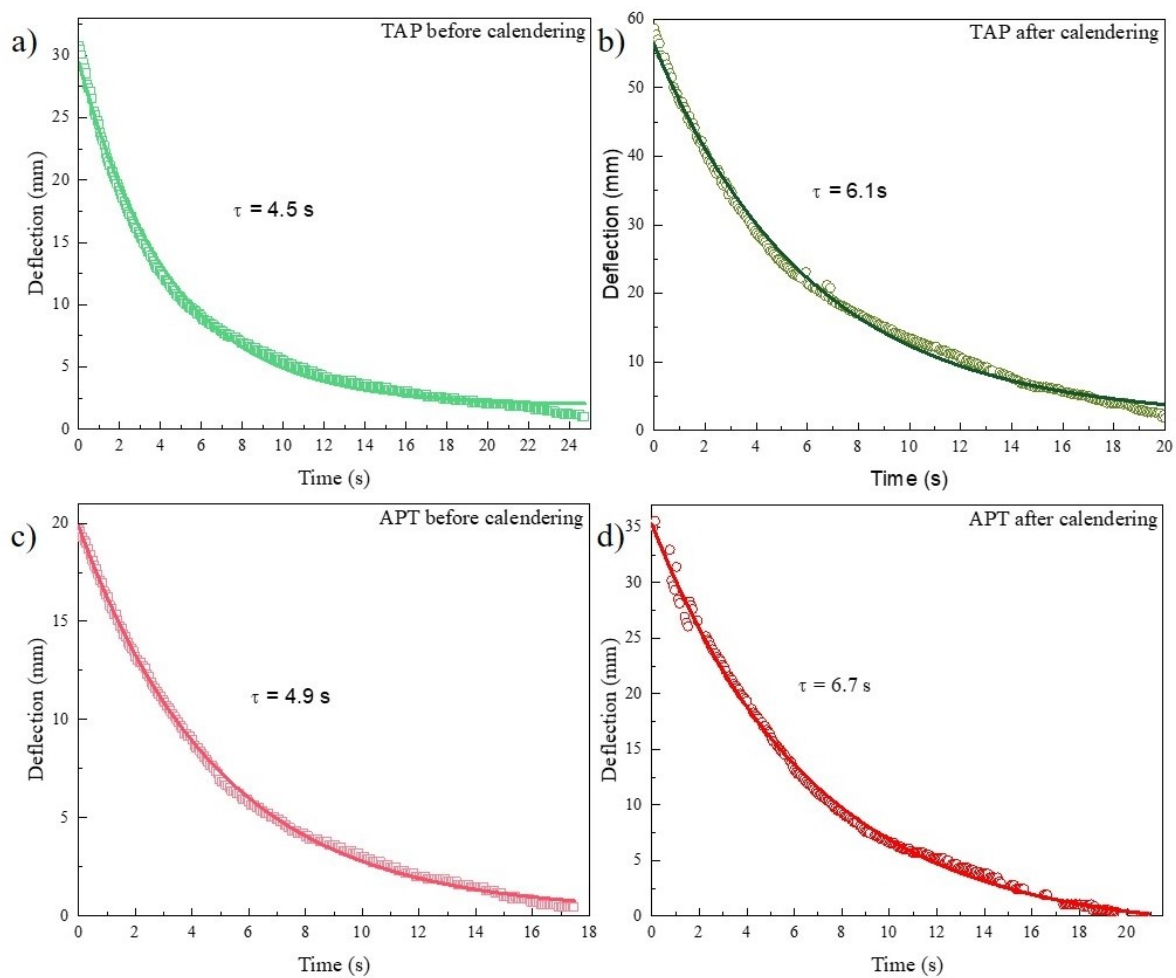


Figure S9. Relaxation profiles of actuators (Error: $\pm 0.07\text{s}$).

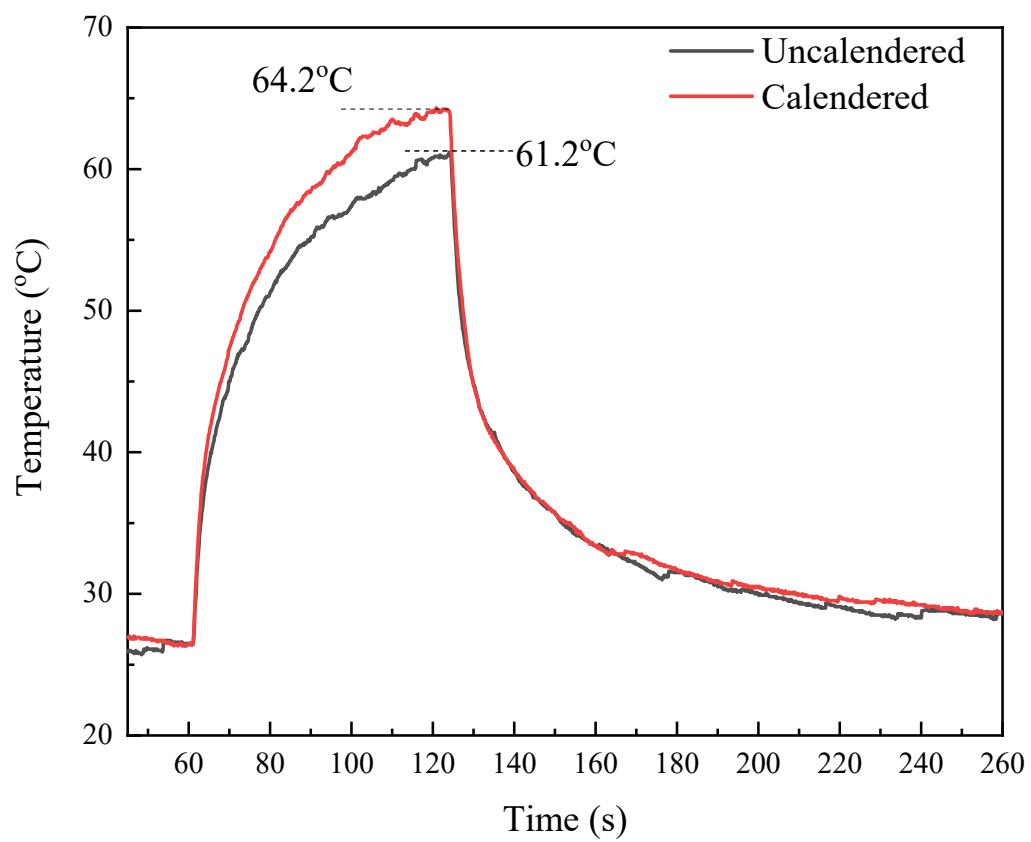


Figure S10. Temperature profiles in transmission mode, before and after calendering.

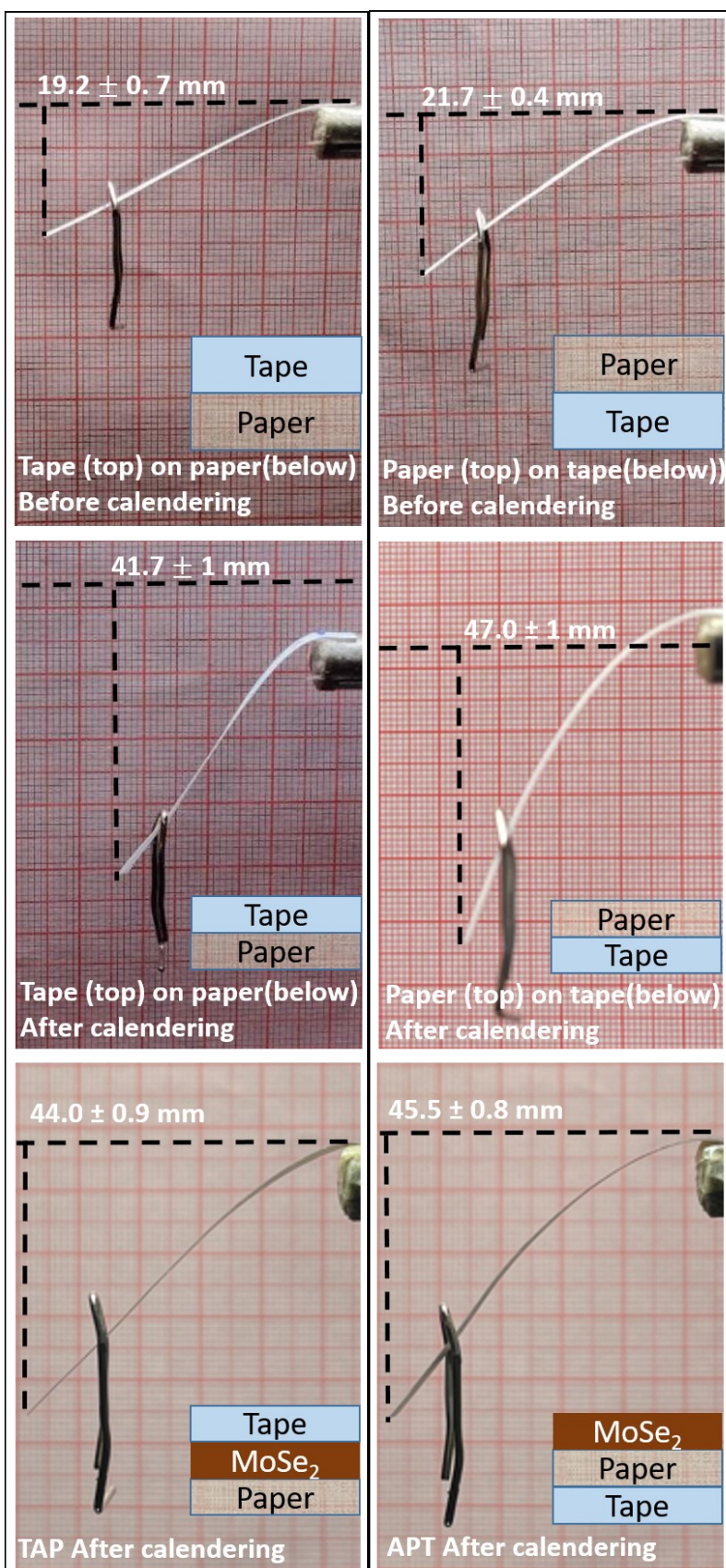


Figure S11. Deflection in cantilever tip of paper-tape bilayers before and after calendaring.

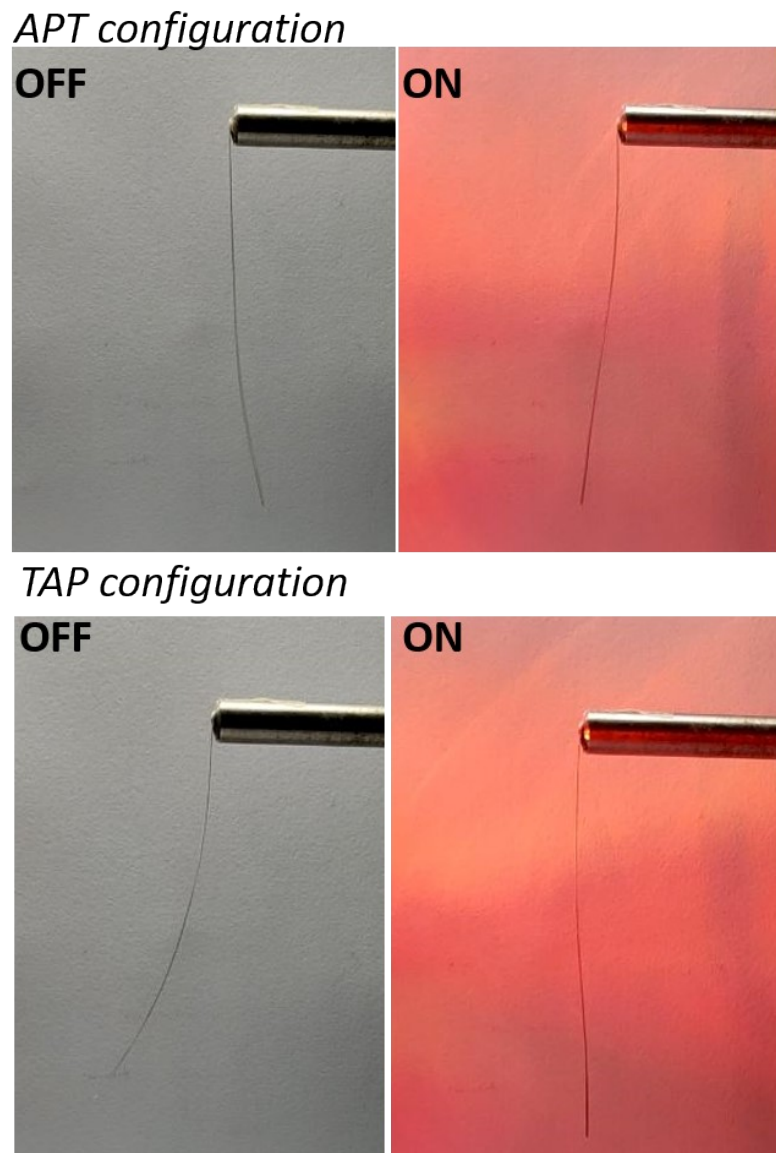


Figure S12. Photothermal actuation with poor interface between tape and paper.

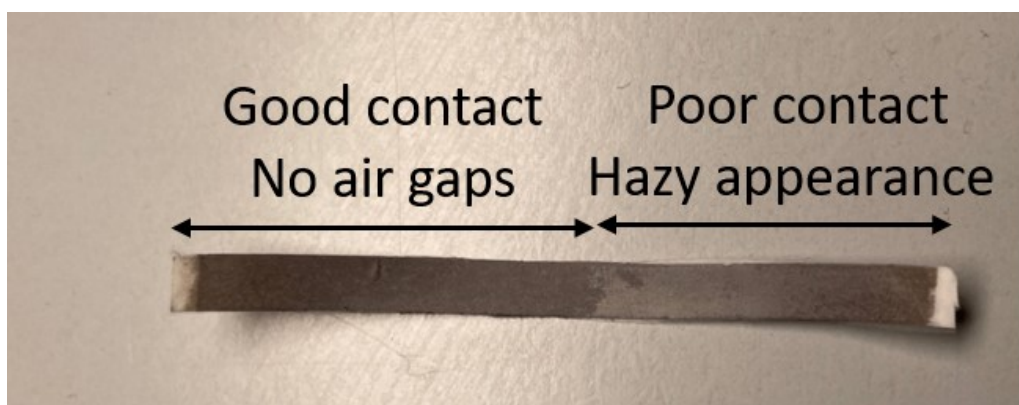


Figure S13. Photograph of a TAP actuator showing the interface between the tape and MoSe₂ coated paper.

References

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