

Supplementary Information for

**Programmable soft electrothermal actuators based on free-form printing of
the embedded heater**

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1. Uniform bending deformation and FEA simulation at different actuation voltages

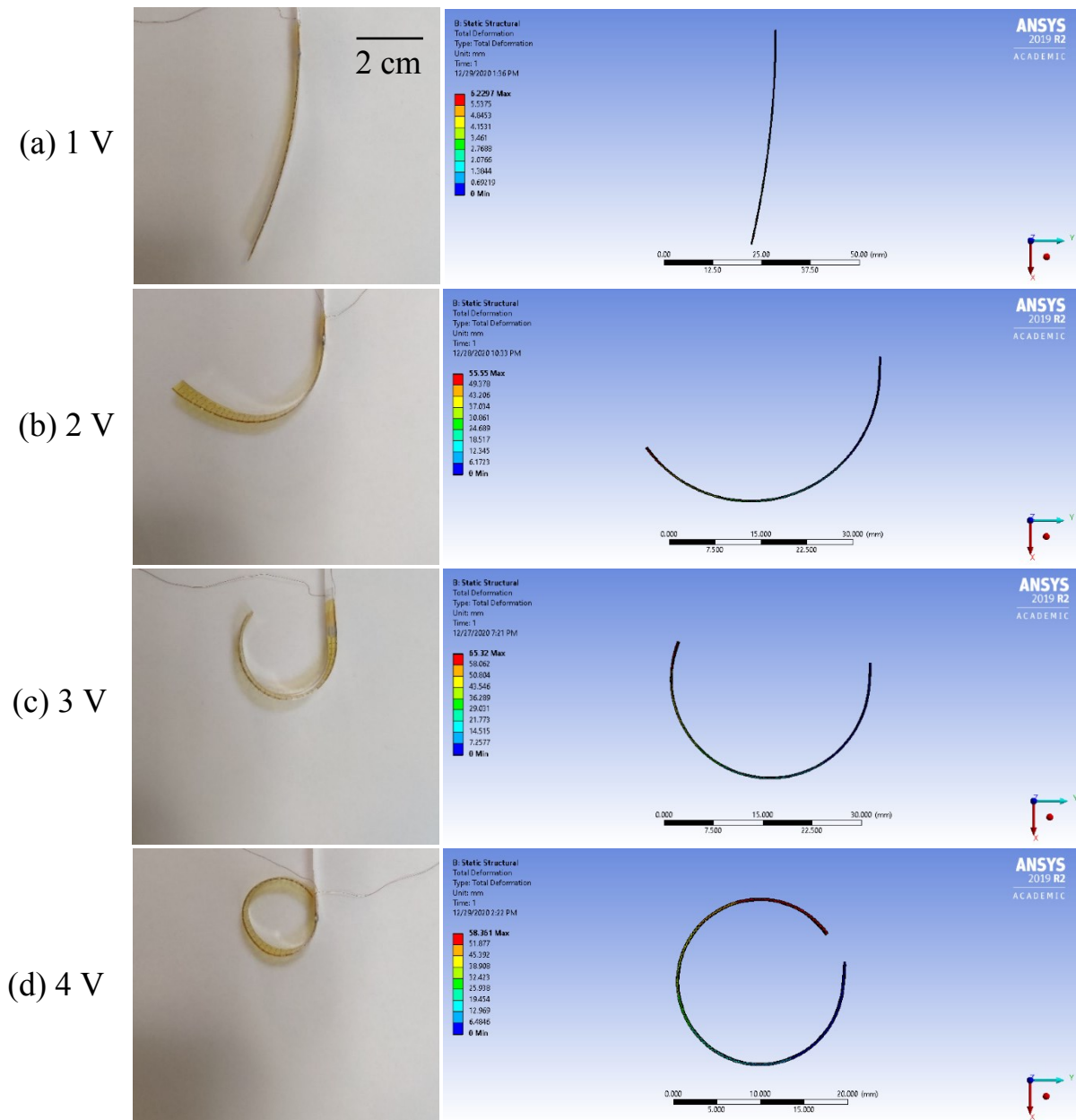


Fig. S1 Uniform bending deformation and FEA simulation at different actuation voltages. (a) 1 V; (b) 2 V; (c) 3 V; (d) 4 V.

2. Folding deformation and FEA simulation at different actuation voltages

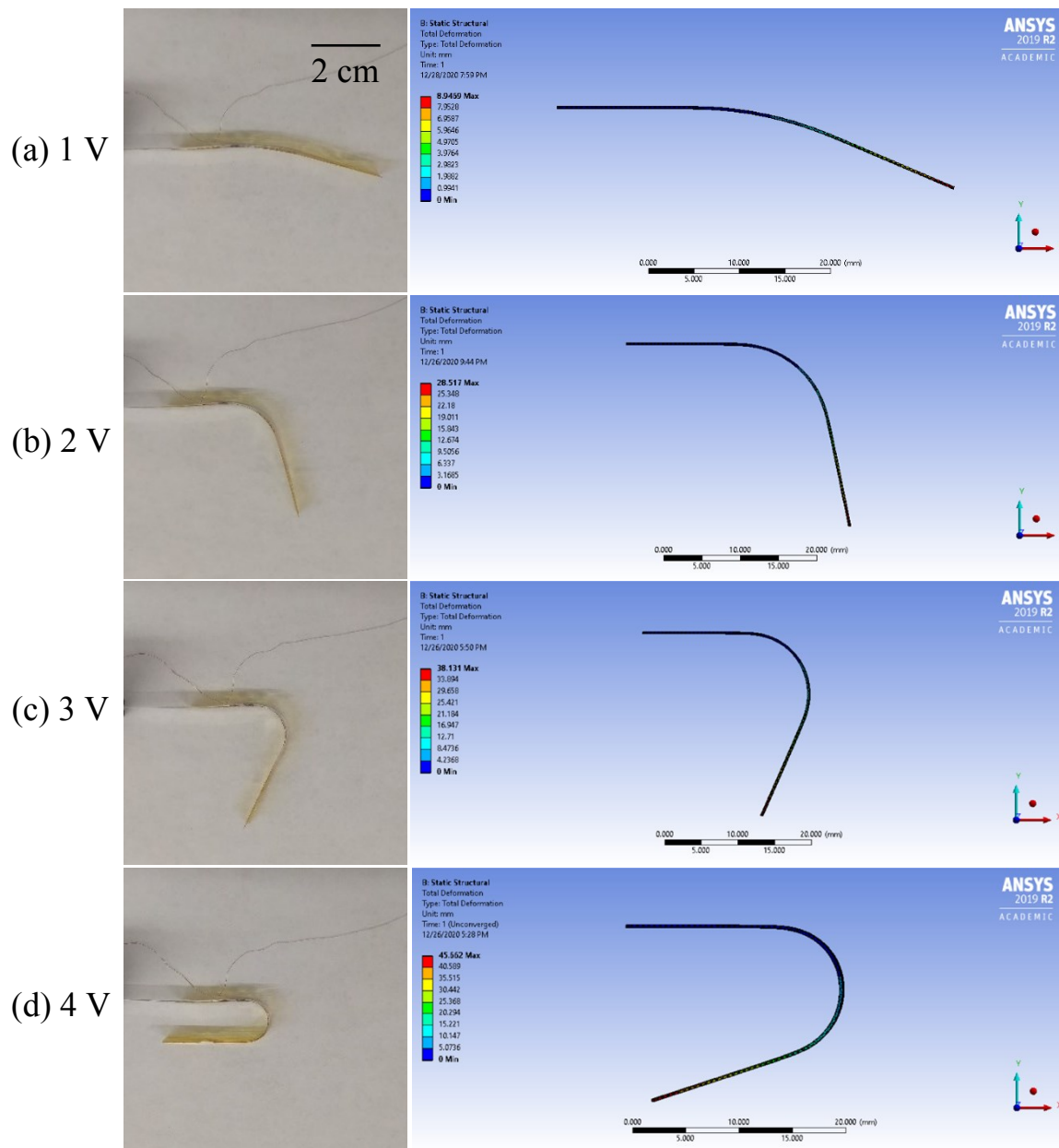


Fig. S2 Folding deformation and FEA simulation at different actuation voltages. (a) 1 V; (b) 2 V; (c) 3 V; (d) 4 V.

3. Twisting deformation and FEA simulation at different actuation voltages

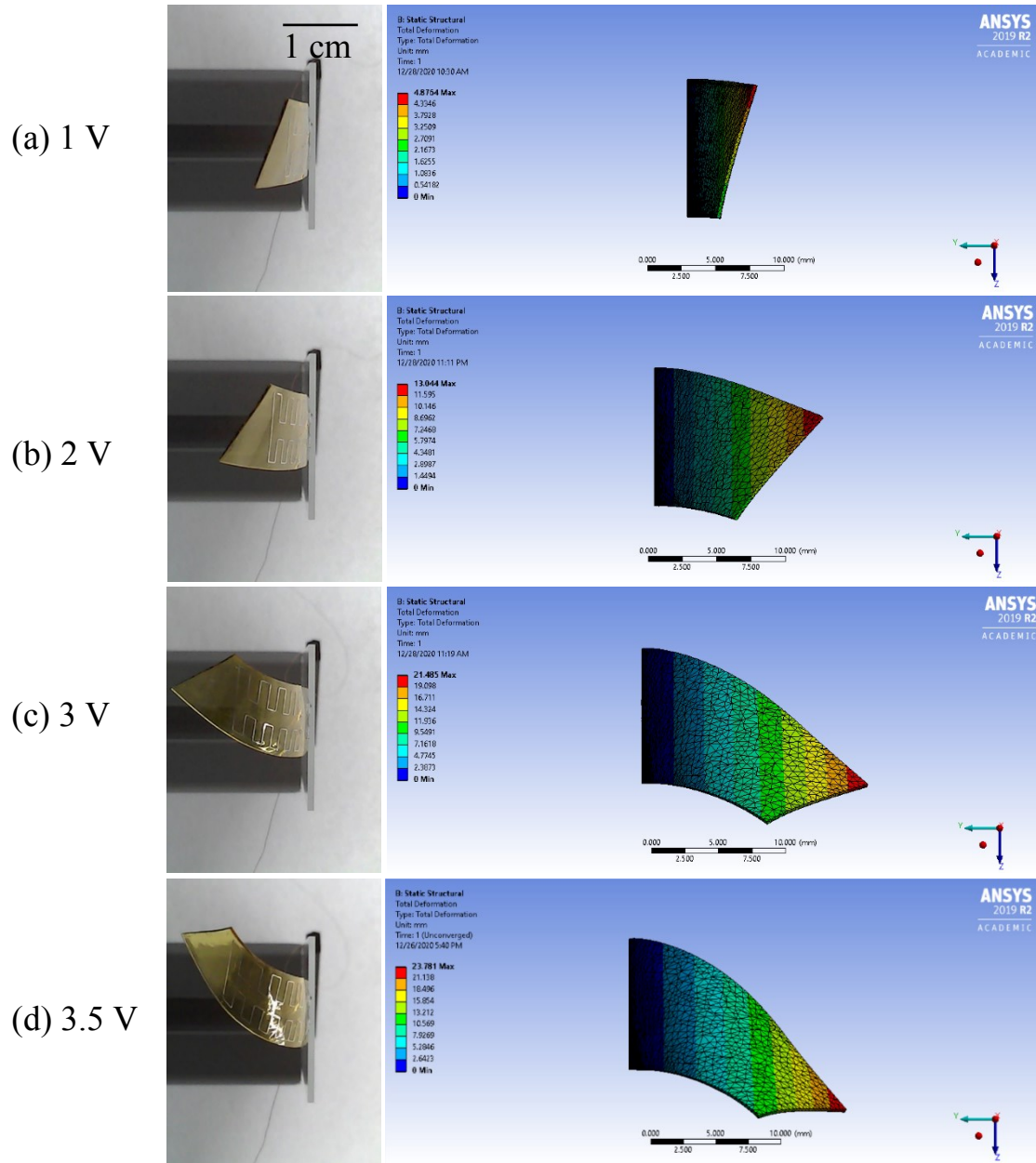


Fig. S3 Twisting deformation and FEA simulation at different actuation voltages. (a) 1 V; (b) 2 V; (c) 3 V; (d) 3.5 V.

4. Video clips

Video S1. Folding deformation (speed up to 20X faster).

Video S2. Twisting deformation (speed up to 20X faster).

Video S3. Two degree-of-freedom soft robot arm (speed up to 20X faster).

Video S4. Soft walker on the ratchet surface (speed up to 20X faster).

Video S5. Bidirectional soft walker on the flat surface (speed up to 20X faster).