Electronic Supplementary Information

Highly Thermally Conductive Liquid Metal-based Composites with Superior Thermostability for Thermal Management

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1. The size distribution of ANFs and LM droplets

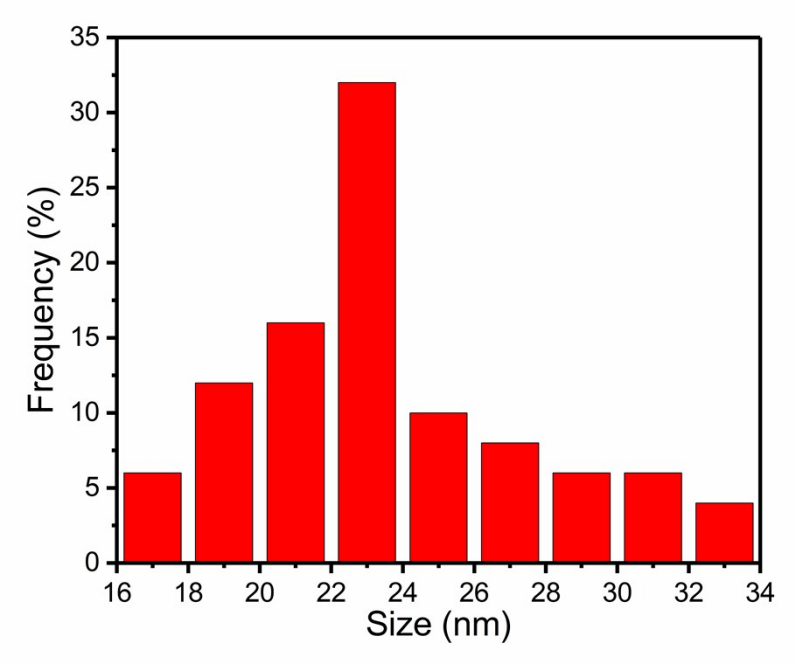


Fig. S1 The size distribution of ANFs.

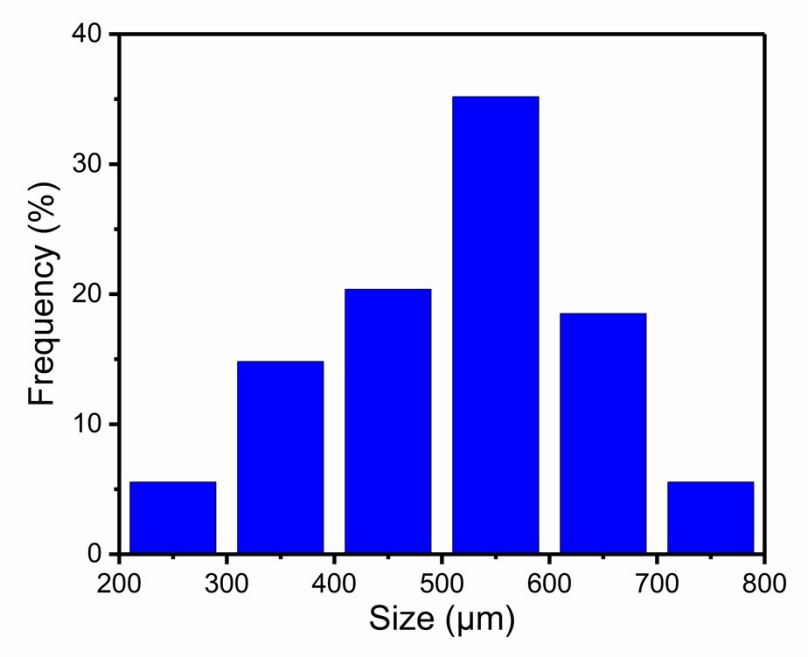


Fig. S2 The size distribution of LM droplets.

2. The fracture morphology of pure ANF film

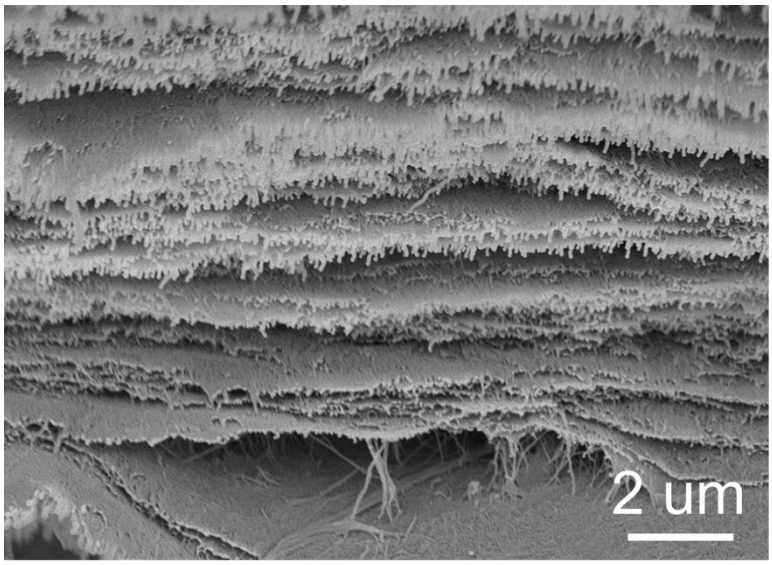


Fig. S3 SEM image of pure ANF film.

3. The fracture morphology of the 20 vol% LM/ANF composite film

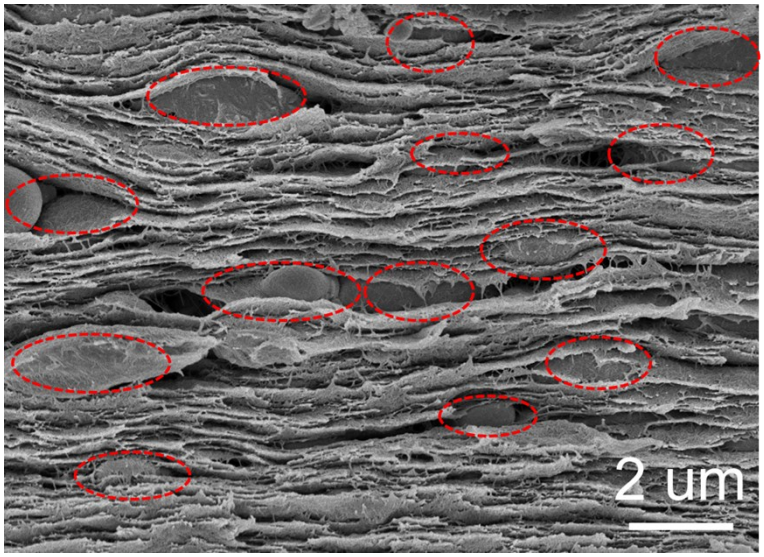


Fig. S4 SEM image of the LM/ANF composite film at 20 vol% LM content.

4. The evaluation of in-plane heat conduction for the specimens

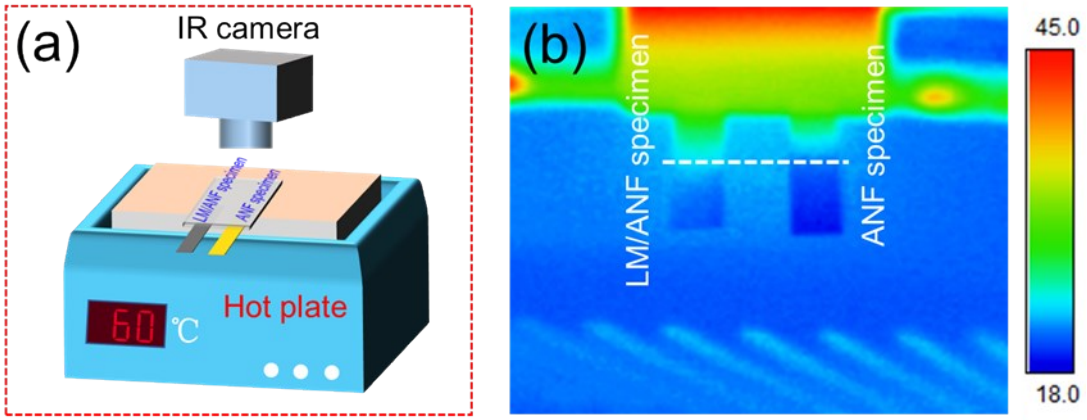


Fig. S5 (a) The schematic diagram for the testing apparatus on the actual performance of in-plane heat conduction for the 40 vol% LM/ANF composite film and pure ANF film specimens. (b) the corresponding thermography of the specimens.

5. Comparison of the thermal conductivity of the LM/ANF composite films with orther LM based TCPCs

Table S1 Thermal conductivity of the LM/ANF composite films compared with the other reported LM based TCPCs in the literature.

Matrix	Filler	Filler content (vol%)	Though-plane TC ($W\ m^{-1}\ K^{-1}$)	Reference
ANF	**LM**	**40**	**1.68**	**This work**
SE[a)]	LM	50	1.30	1
PDMS[a)]	LM	66.1	2.20	2
CNC/PV [a)]	LM	~	0.53	3
SE[a)]	LM	80	6.7	4
PDMS[a)]	LM	50	1.50	5

SE, PDMS, CNC, and PVA represent silicone elastomer, PDMS(polydimethylsiloxane), poly(vinyl alcohol), and cellulose nanofiber, respectively.

6. The tensile fracture morphology of the 20 vol% LM/ANF composite film

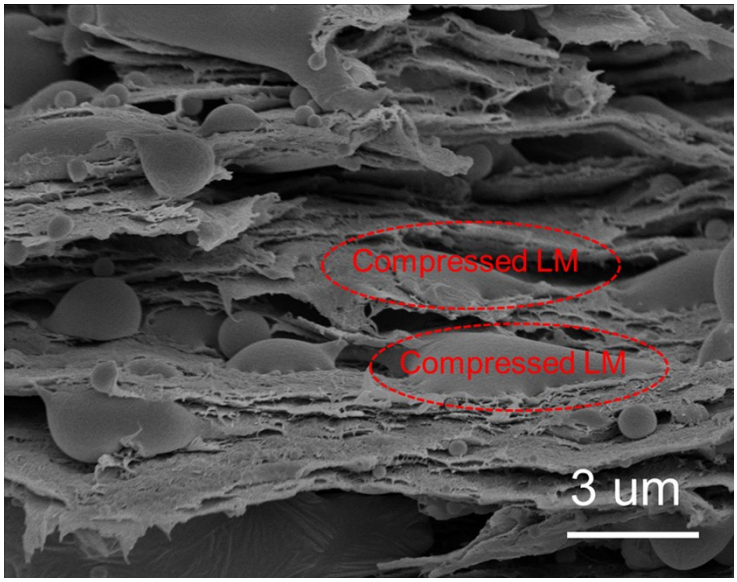
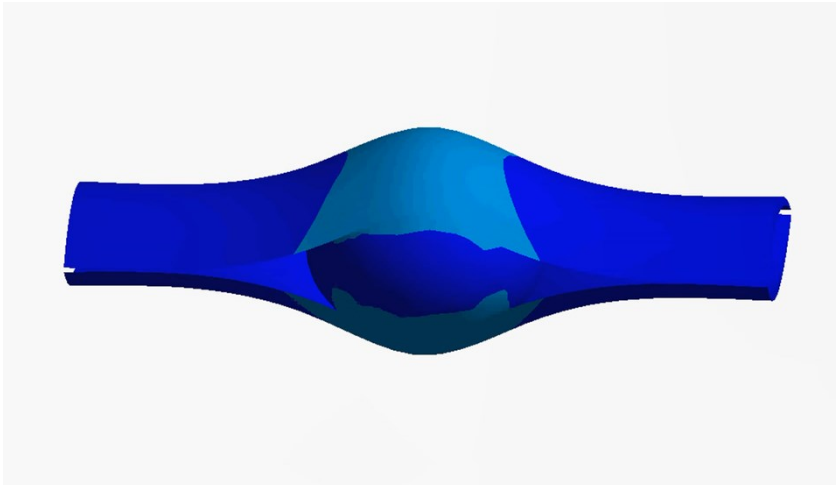
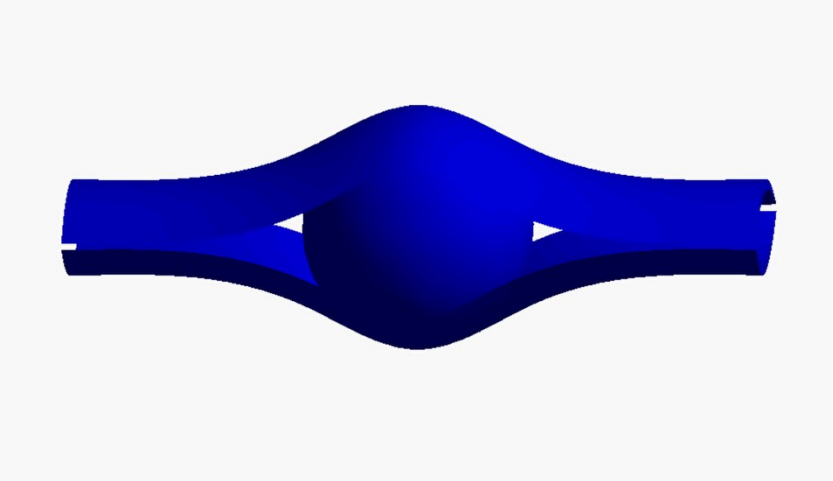


Fig. S6 The tensile fracture morphology of the 20 vol% LM/ANF composite film.

7. The dynamical changes of the LM and rigid filler based ANF composites during the stretching process



Video S1 The dynamical changes of the LM based ANF composites during the stretching process.



Video S2 The dynamical changes of the rigid filler based ANF composites based ANF composites during the stretching process.

References

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