

## Supporting Information

### **Transparent thermal insulation ceramic aerogel materials for solar thermal conversion**

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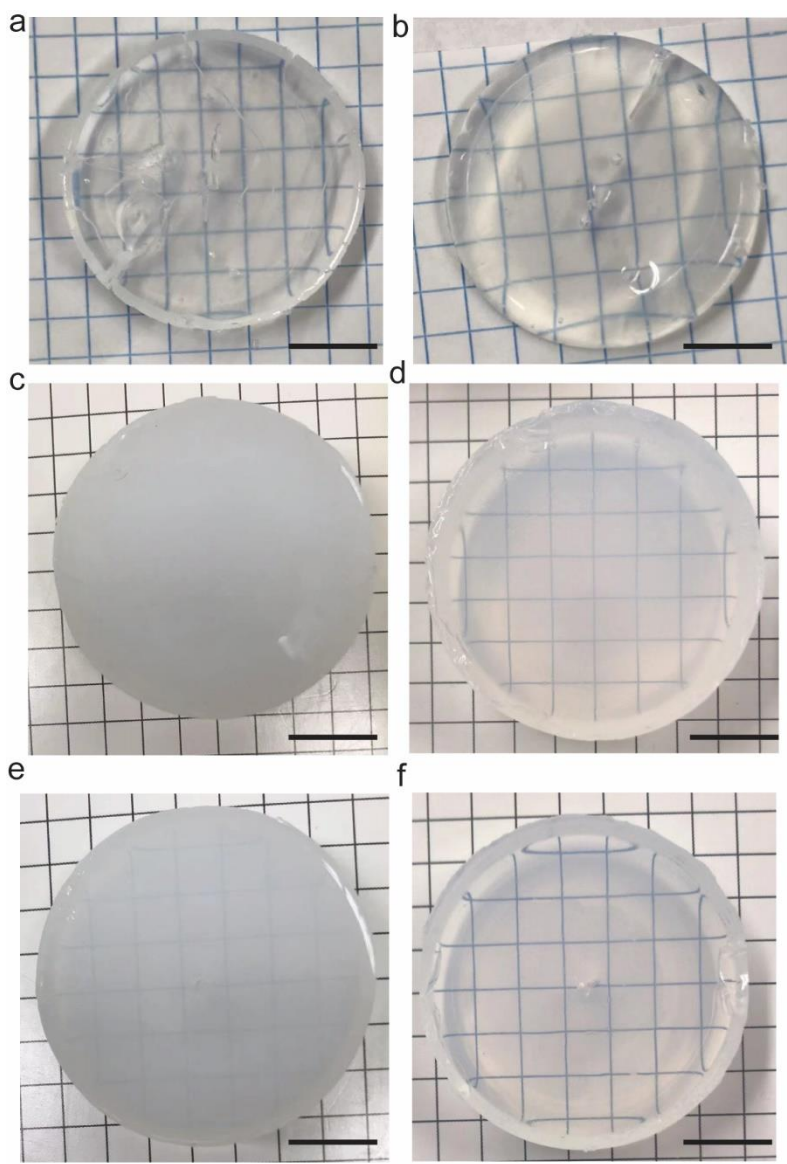


Fig. S1. Optical image of gels with the initial pH of (a) 6.5 (b) 3.2 after solvent exchange. The gels with initial pH of 2.8 (c) before the solvent exchange, and (d) after solvent exchange. The gels with initial pH of 2.5 (e) before solvent exchange, and (f) after solvent exchange. Scale bars are 10 mm.

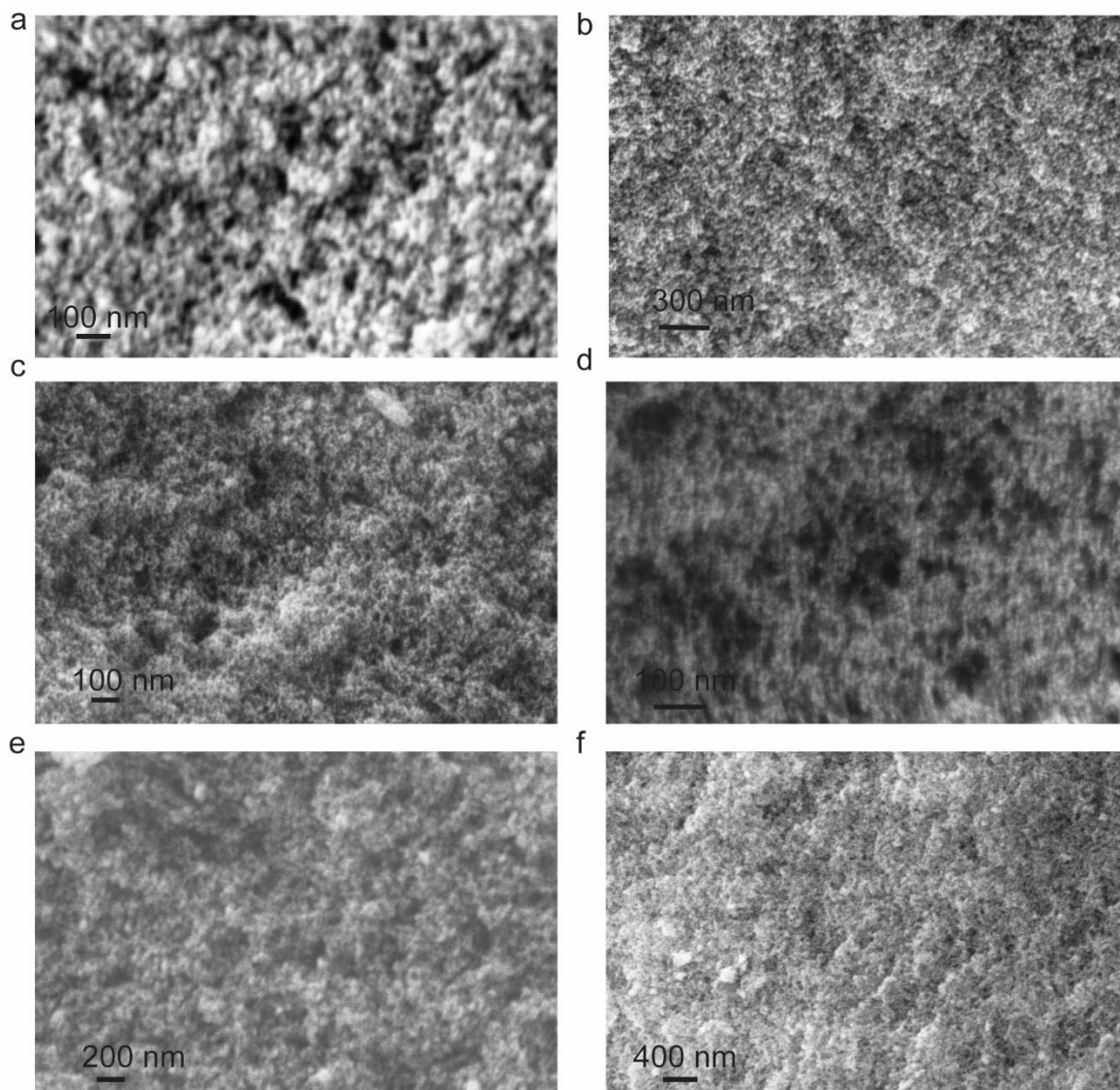


Fig. S2. SEM images of different samples with initial pH of (a) 6.5, (b) 3.2, (c) 2.8, and (d) 2.5, (e) 2.2 (f) 2.

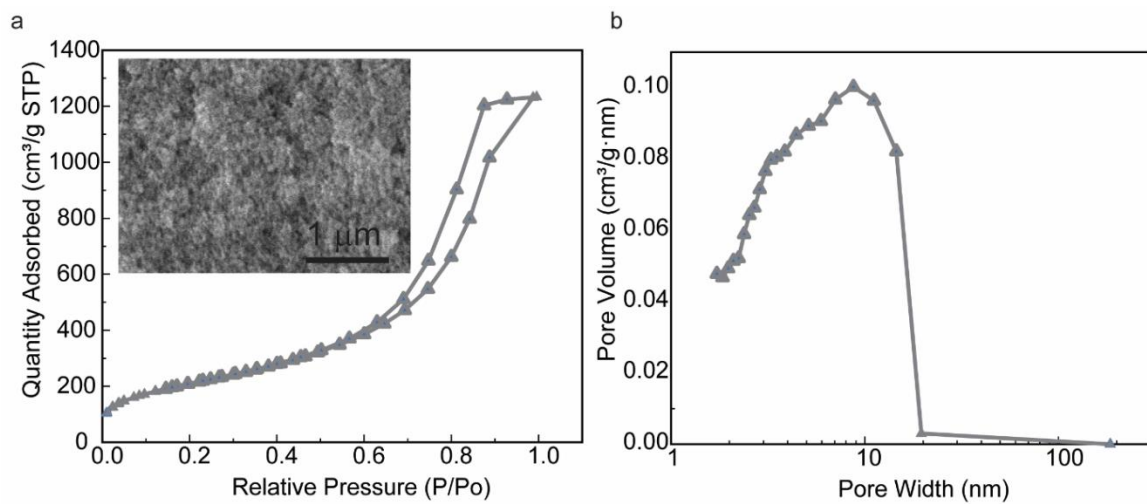


Fig. S3. (a) BET curve of sample with the initial pH of 4, and (b) pore size distribution.

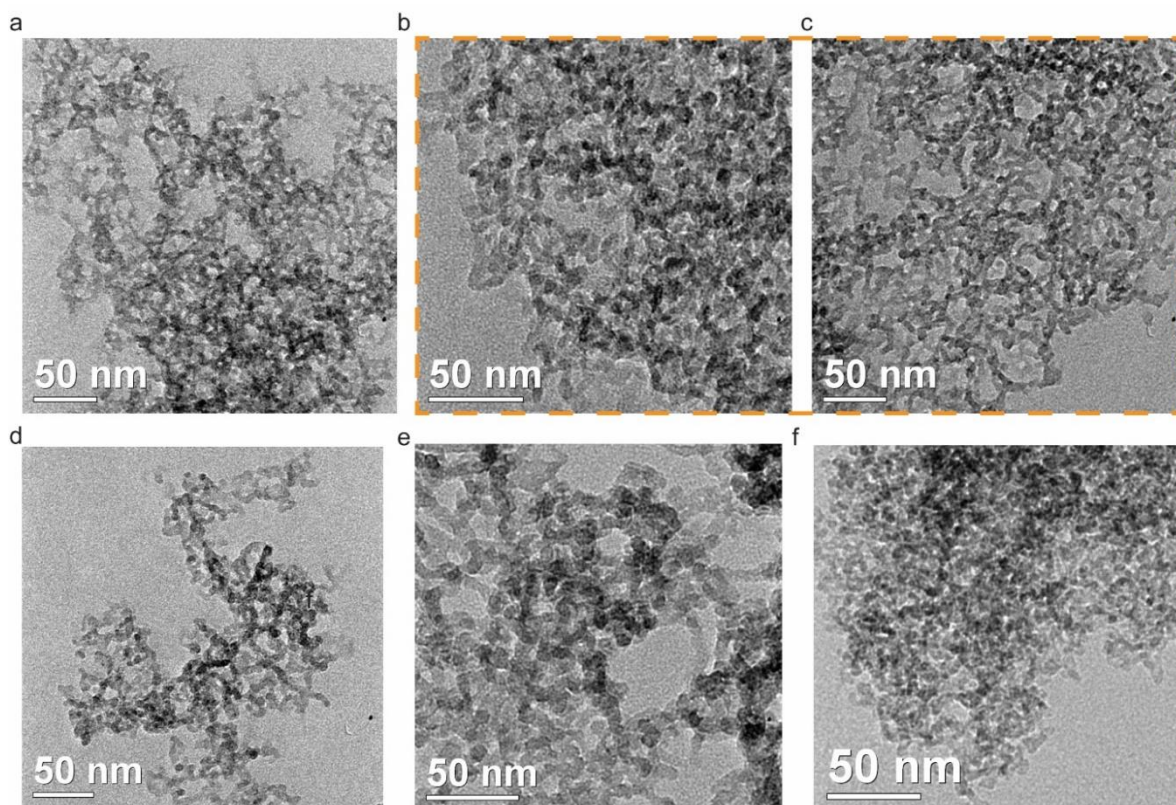


Fig. S4. TEM images of gels with the initial pH of (a) 6.5, (b) 2.5, and the hydrophobic dried sample with the initial pH of (c) 2.5, (d) 3.2, (e) 2.8, and (f) sintered sample.

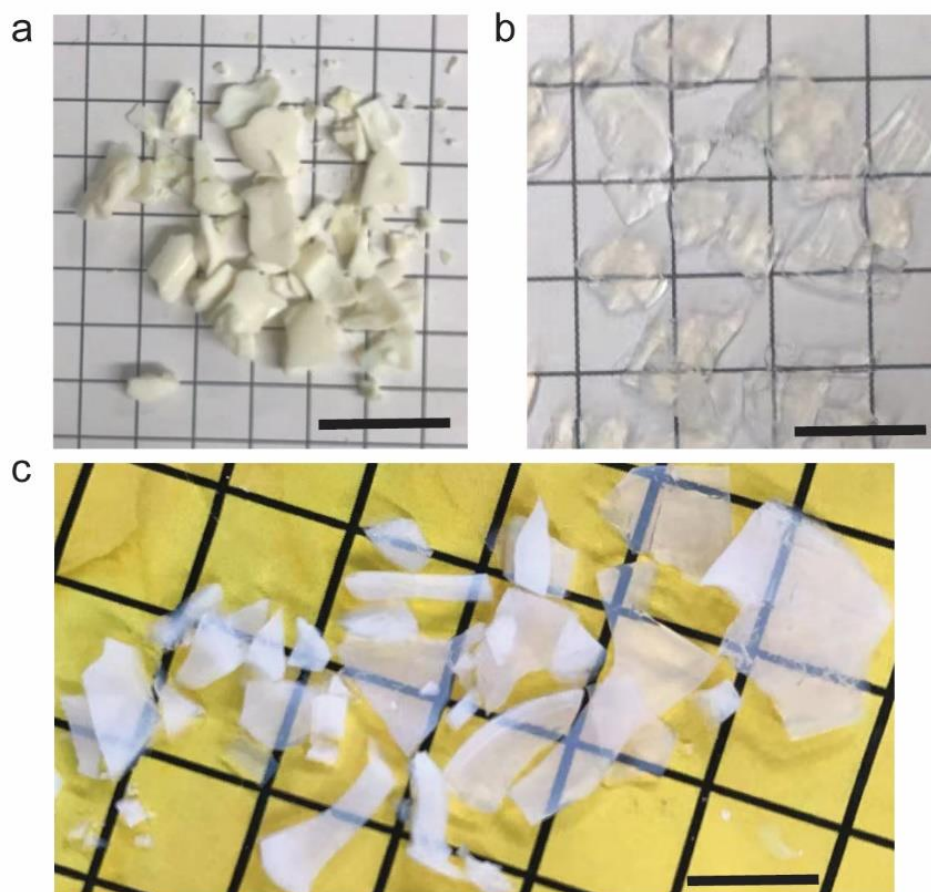


Fig. S5. Optical images of (a-b) dried TMCS silylation modified silica flakes (yellow color induced by not enough modification), and the transparent silica after sintering treatment. (c) Hydrophobic silylation modified transparent silica flakes. Scale bars are 10 mm.

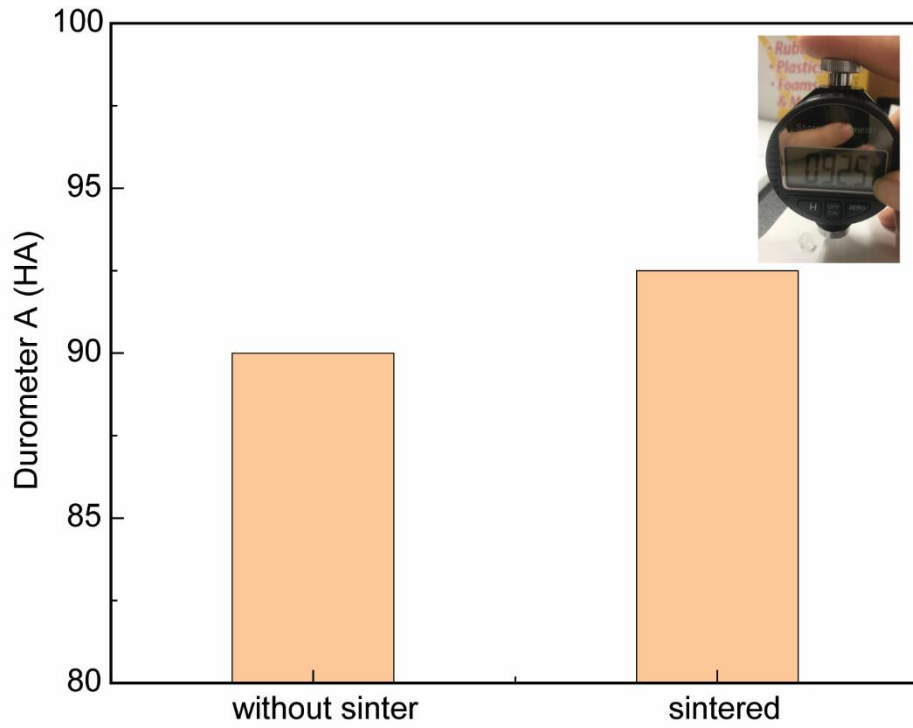


Fig. S6. Durometer hardness of samples with and without sintering treatment. The other samples cannot be indented due to the fragile microstructure.

Table S1. Parameters for solar intensity of solar simulator in this work

Distance from illuminator (inches(mm))	Readings with standard AM 1.5 G Filter (mW/cm <sup>2</sup> )
7 (178)	100
9 (229)	69

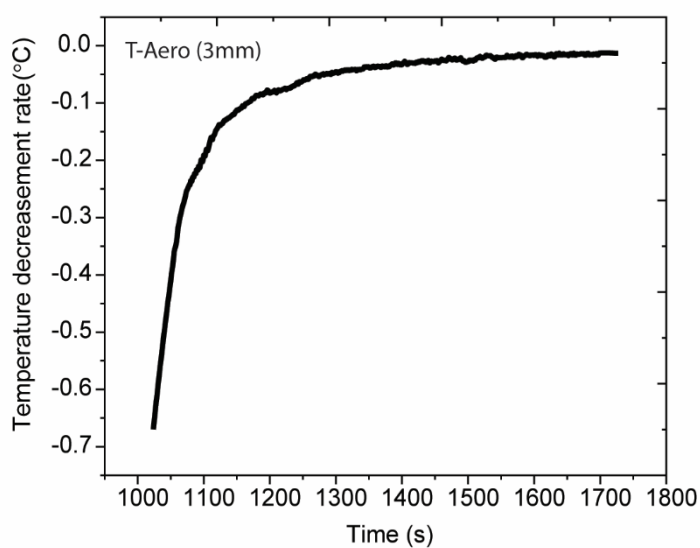


Fig. S7. Temperature decreasing rate profile after shutting off the solar simulator.