Supporting information

Surfactant templated biogenic nanoporous silica thermal insulation composite

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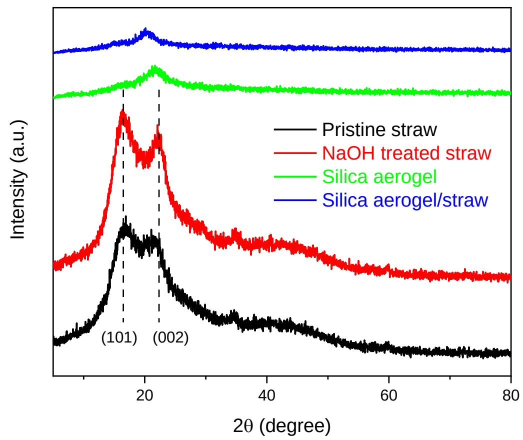

Figure S1. XRD spectroscopy of the pristine straw, NaOH treated straw, silica aerogel and silica aerogel/straw composite.

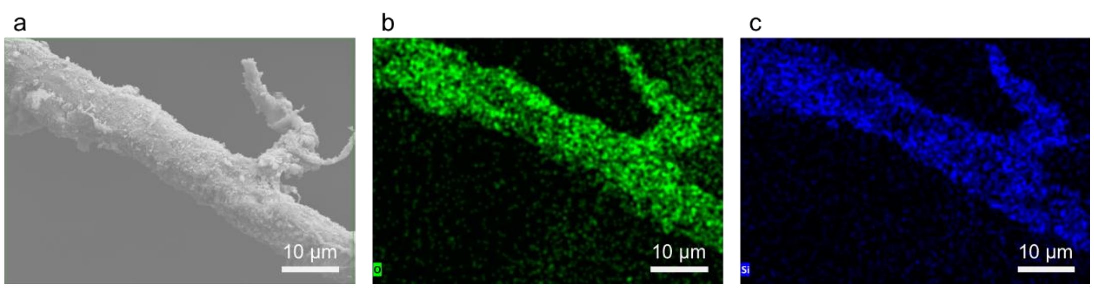

Figure S2. SEM image (a), EDX elemental mapping of O (b) and Si (c) of nanoporous coated straw fiber.

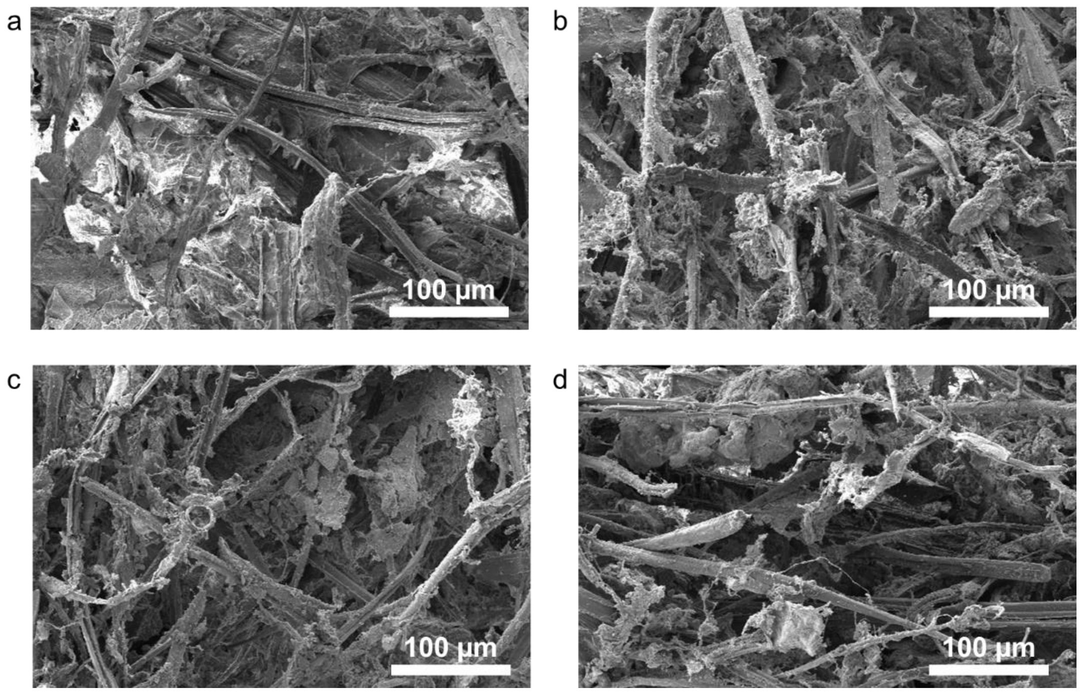

Figure S3. SEM images of composites with 20 wt% silica, dried using different methods: (a) water-based drying in an oven (60 °C), (b) air drying (20 °C), (c) freeze-drying (-84 °C), and (d) ethanol solvent exchange (20 °C).

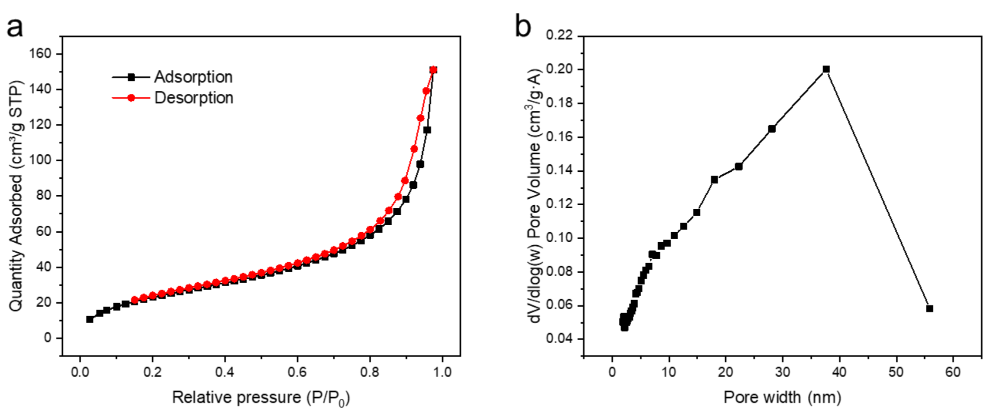

Figure S4. (a) Nitrogen adsorption−desorption isotherm curve of the composite with 20 wt% silica, dried using the solvent exchange method, analyzed by Brunauer−Emmett−Teller (BET) theory. (b) Pore size distribution determined by the Barrett−Joyner−Halenda (BJH) method.

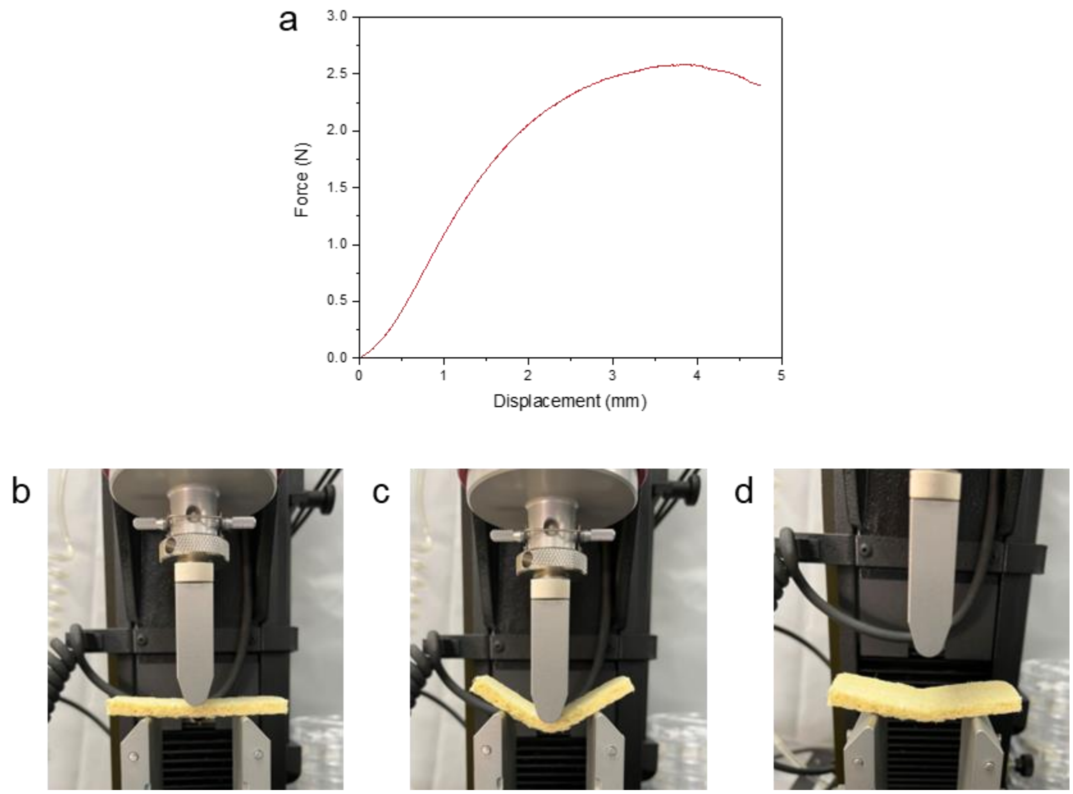

Figure S5. (a) Typical force-displacement curve obtained from the three-point bending test on the composite sample with 20 wt% silica, dried using the solvent exchange method. (b-d) Photographs of the samples during the three-point bending test: initial (b); loading (c); and after unloading (d).

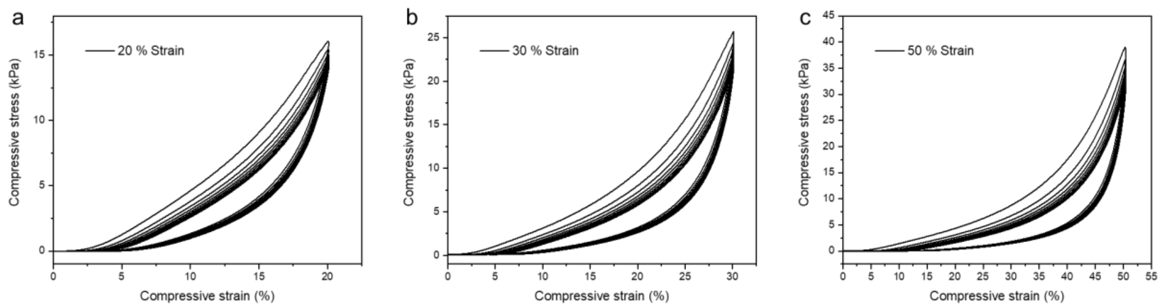

Figure S6. Compressive stress–compressive strain curves from the compression test on the composite with 20 wt% silica, dried using the solvent exchange method, for cyclic tests at 20% strain (a), 30% strain (b), and 50% strain (c).