Supporting Information

Ultralight elastic Al_2O_3 nanorod-graphene aerogel for pressure sensing and thermal superinsulation

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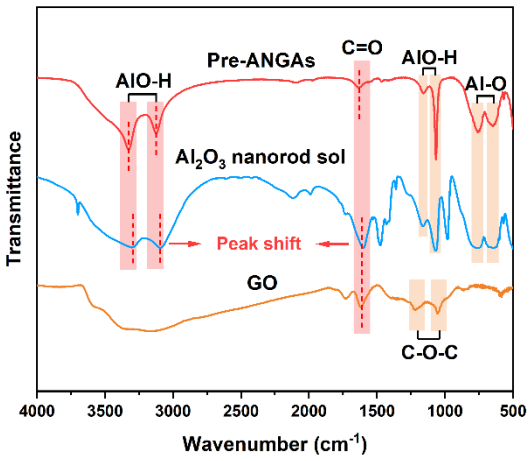

Fig. S1. FTIR spectra of GO, Al_2O_3 nanorod sol and Pre-ANGAs.

Fig. S1 shows the FTIR patterns of graphene oxide (GO), Al_2O_3 nanorod sol, and precursors of ANGAs (Pre-ANGAs) after freeze-drying. Due to the presence of organic substances in the Al_2O_3 nanorod sol (acetate and aluminum acetate), absorption peaks attributed to C=O (1610 cm^{-1}) appear in both Al_2O_3 nanorod sol and GO spectra [9,10]. The peaks at 1090 and 1220 cm^{-1} are attributed to methylene ether bridges (C-O-C) and the broad peak at around 3400 cm^{-1} belongs to –OH [26]. Several typical characteristic peaks in Al_2O_3 nanorod sol originate from the stretching vibrations (3099 and 3285 cm^{-1}) and bending vibrations (1070, 1162 cm^{-1}) of AlO-H, and the torsional vibrations

of Al-O (650 and 760 cm^{-1}), respectively [11,12]. Notably, after integrating ARs, RF, no new characteristic peaks appear in Pre-ANGAs, but the C=O peak is slightly shifted to 1630 cm^{-1}, and the stretching vibration peaks of Al-O are also shifted (3120 and 3320 cm^{-1}), implying the hydrogen bonding between GO and Al_2O_3 nanorods.

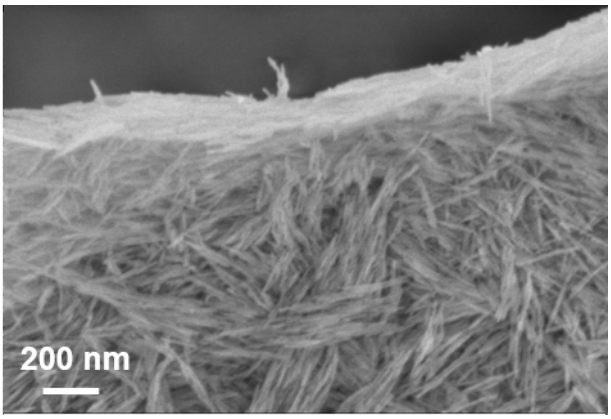

Fig.S2. Enlarged SEM image of ANGAs.

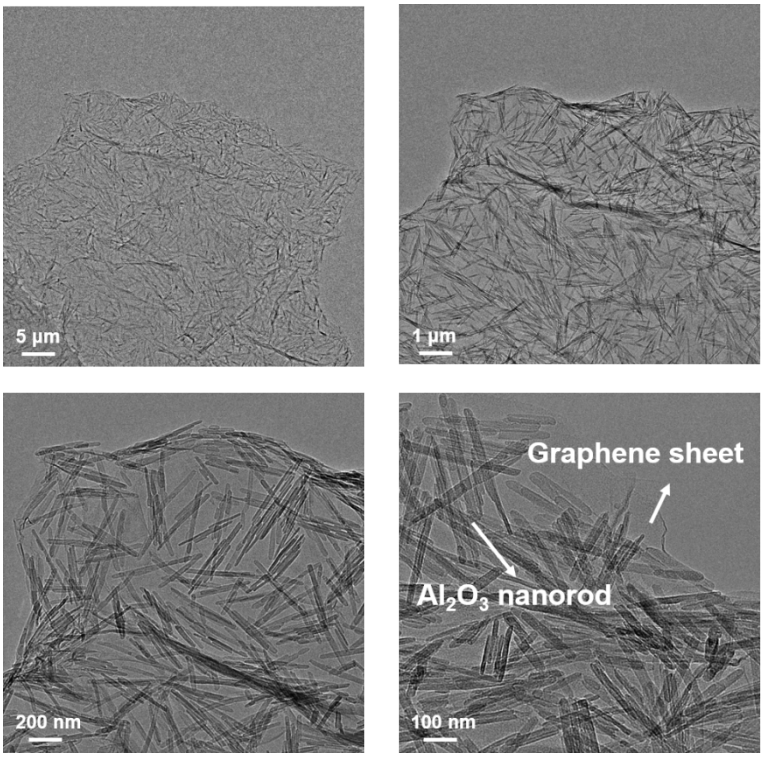

Fig. S3. TEM images of ANGAs.

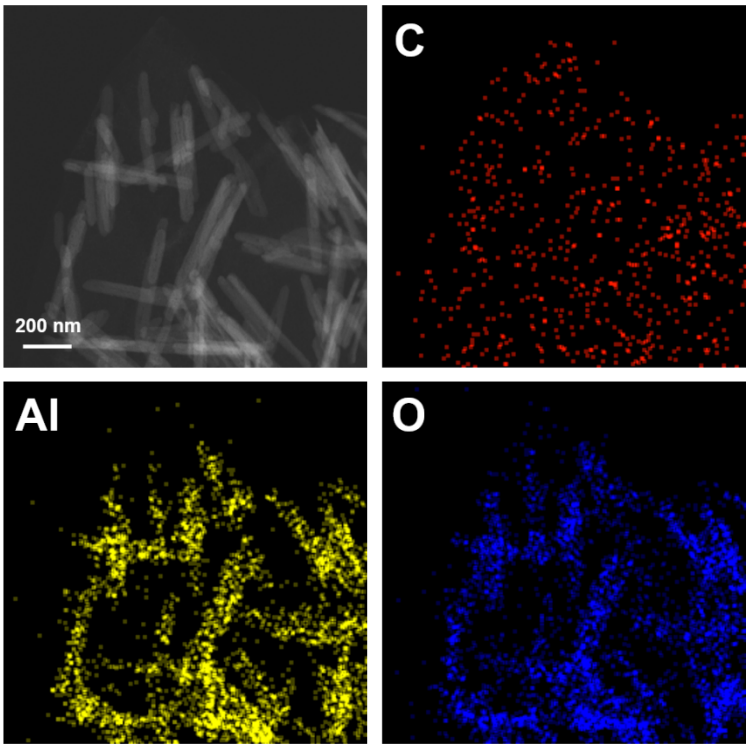

Fig. S4. EDS mappings of ANGAs.

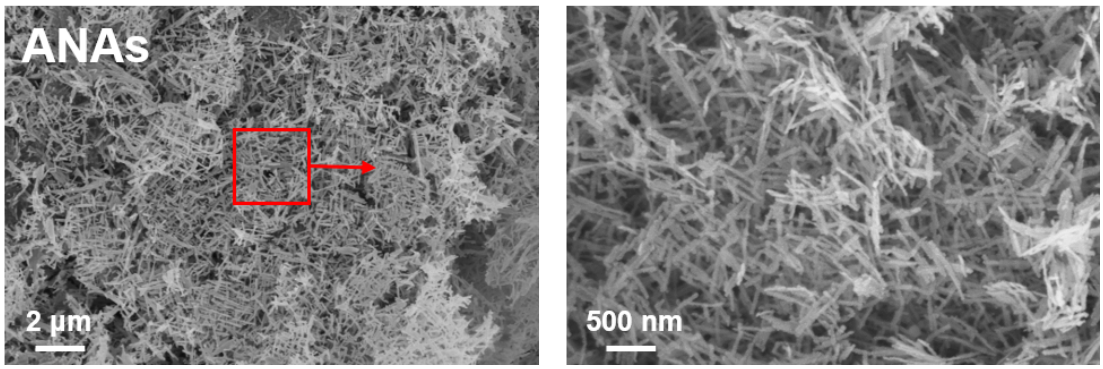

Fig. S5. SEM images of ANAs