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SUPPORTING INFORMATION

Exceptionally high thermal and electrical conductivity of three dimensional graphene foam based polymer composites

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SUPPLEMENT

The binding energy profile measured by X-ray photoemission spectroscopy, which was used to further explore the chemical compositions of GNPs, as demonstrated in **Figure S1**. This figure shows C_{1s} binding energies at 285.2 eV (C-OH), 286.6 eV (C=O), and 289 eV (O=C-OH), respectively, suggesting that some oxygen-containing functional groups are present, where the atomic percentages of various carbon bonds derived from the fitted peak areas are indicated in **Figure S1**.

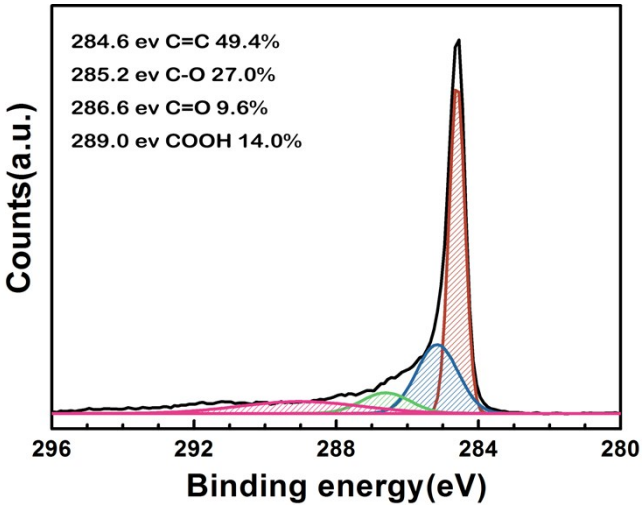

Figure S1. XPS spectra of GNP.

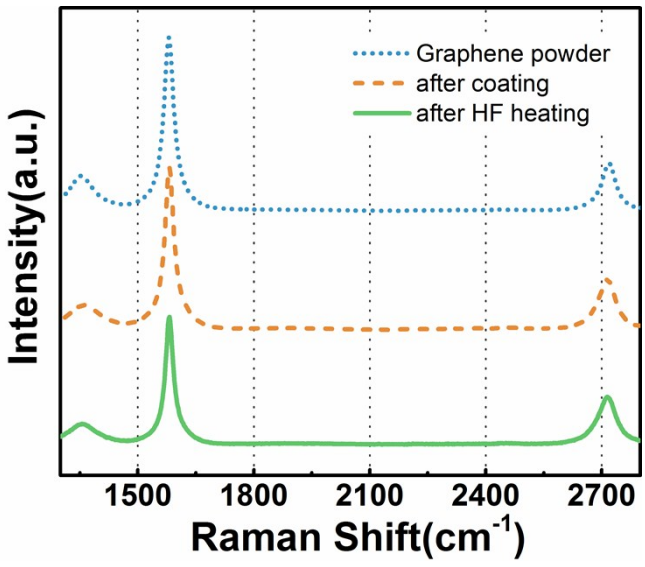

Figure S2. Raman spectra of GNP.

Raman spectra were often assigned to be an effective method to characterize carbon-related materials. As can be seen in **Figure S2**, the prominent G peak at 1579 cm^{-1} corresponds to the high-frequency E_{2g} phonon at Γ. In addition, the D-band (1345 cm^{-1}) intensity is related to the defect, sp^3-

hybrided carbon which can be activated at the edges. The I_D/I_G ratio reflects the degree of the defects in the GNPs structure. The Low I_D/I_G ratio means high crystalline quality of graphene, which has good thermal conduction property. The decline of I_D from the graphene powder to the GF after PU decomposition indicates that the defects have been recovered to some extent. The 2D band (2708 cm^{-1}) has been known to be very sensitive to the graphene layer number. From the position and the shape of 2D peak, we can draw a conclusion that graphene flake are constituted by few-layer graphene.

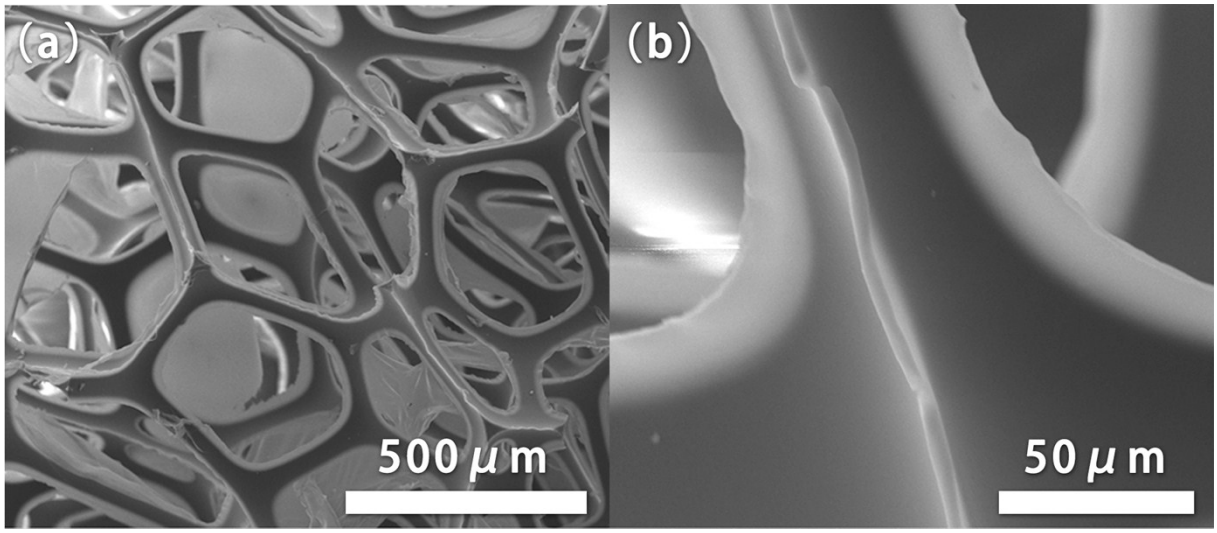

Figure S3. (a) Low- and (b) high-magnification SEM images of neat PU foam.

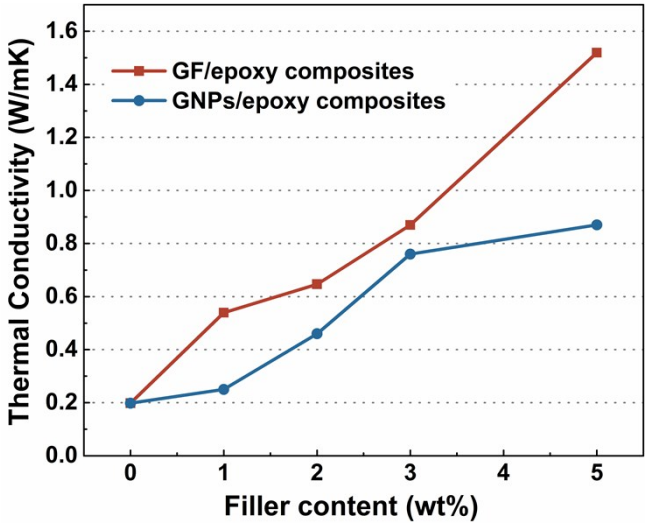

Figure S4. Thermal conductivity of the epoxy composites.