Supplementary Information for

Novel facile self-assembly approach to construct graphene oxide-decorated phase change microcapsules with enhanced photo-to-thermal conversion performance

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Characterization Methods

The morphology and microstructure of the microencapsulated PCM composites were observed on a polarizing microscope (PM) (CX31-P, Olympus) and field emission scanning electron microscopy (SEM) (LEO 1530 VP, Netherlands). The core/shell structure of the microencapsulation was characterized by FT-IR spectra, X-ray diffraction, and Raman spectra. The FT-IR spectra were recorded on a Bruker550 from 400 to 4000 cm^{-1} using KBr pellets, the X-ray diffraction (XRD) patterns of the samples were carried out on X-ray diffractometer (D8 ADVANCE), and the Raman spectra of the products were recorded at ambient temperature on a LabRAM Aramis Raman spectrometer with an argon-ion laser.

The thermal physical properties of samples were characterized by differential scanning calorimeter (DSC), thermal constant analyzer and UV-vis. The phase change temperature and latent heat of the samples were measured by a differential scanning calorimeter (Q20, TA). For DSC measurements, 5-8 mg for every sample was sealed in an aluminum pan at a heating rate of 10 °C·min^{-1} under a constant stream of nitrogen at a flow rate of 50 mL·min^{-1}. The thermal conductivity of the solid samples was characterized by the hot wire method on a thermal constant analyzer (TPS 2500, Hot Disk, Sweden). Before the thermal conductivity measurement, the microencapsulation was compressed to form a cylinder at the same density. The UV-vis diffuse reflection spectrums of samples were performed on a solid UV-visible spectrometer (Evolution 200). The thermal conductivity and specific heat of the heat transfer fluids were conducted by a thermal constant analyzer and DSC, respectively.

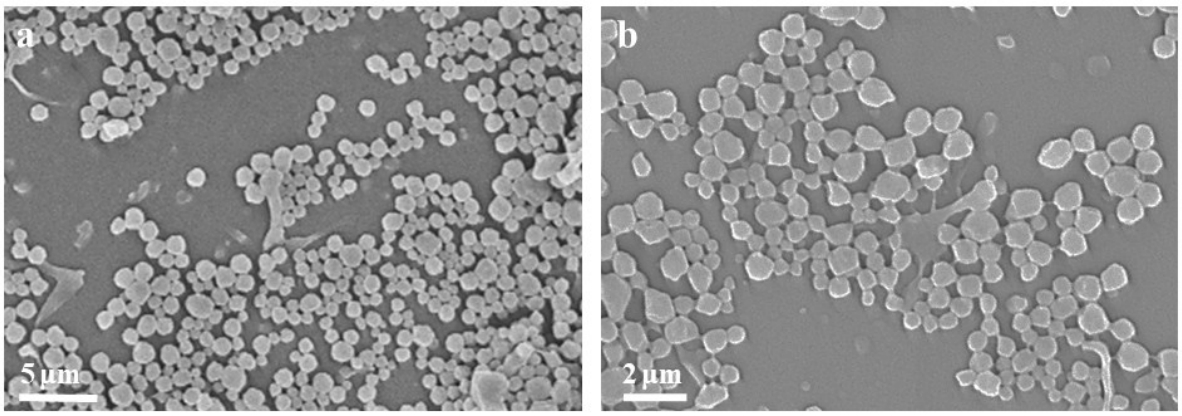

Figure S1. SEM images of EC after self-assembly process.

Figure S2. SEM images of paraffin @EC/MC composite (a) and paraffin @EC/MC/GO composite (b) before heating/cooling cycles.

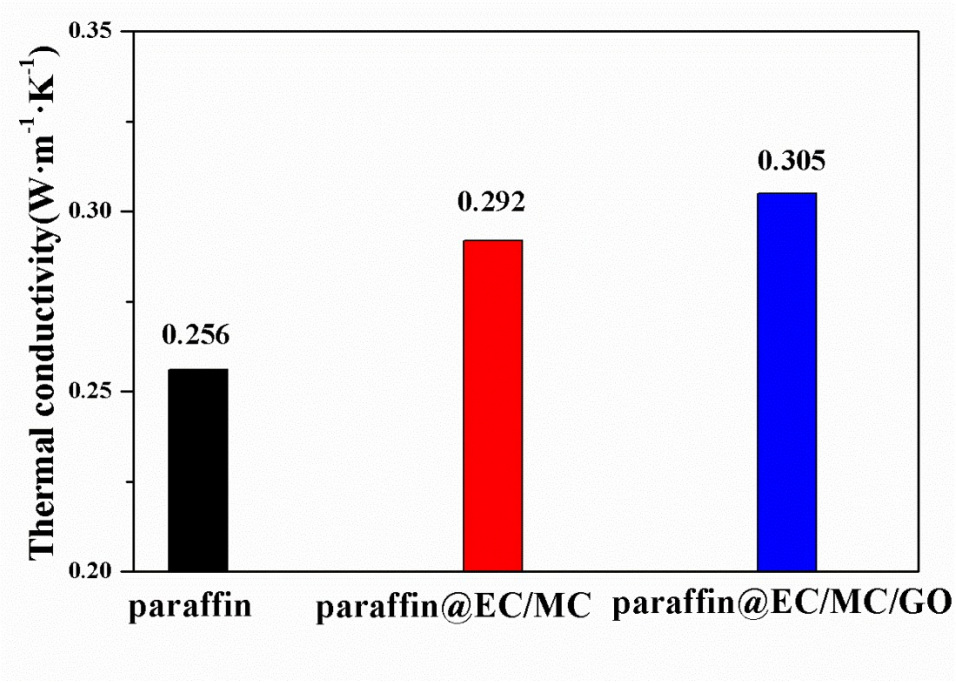

Figure S3. Thermal conductivities of solid pure paraffin, paraffin@ EC/MC composite and paraffin @ EC/MC/GO composite.

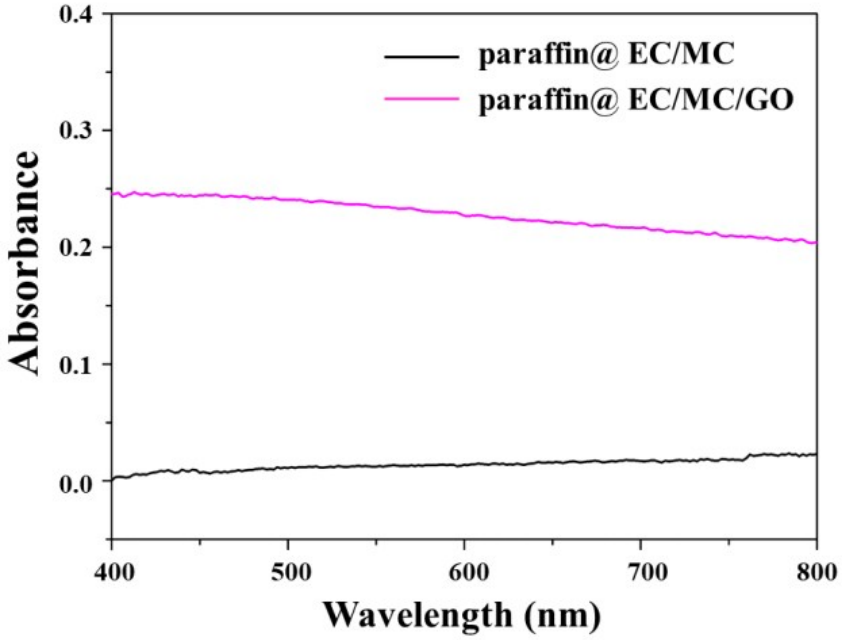

Figure S4. UV-vis diffuse reflection spectrum of paraffin @ EC/MC composite and paraffin @ EC/MC/GO composite.

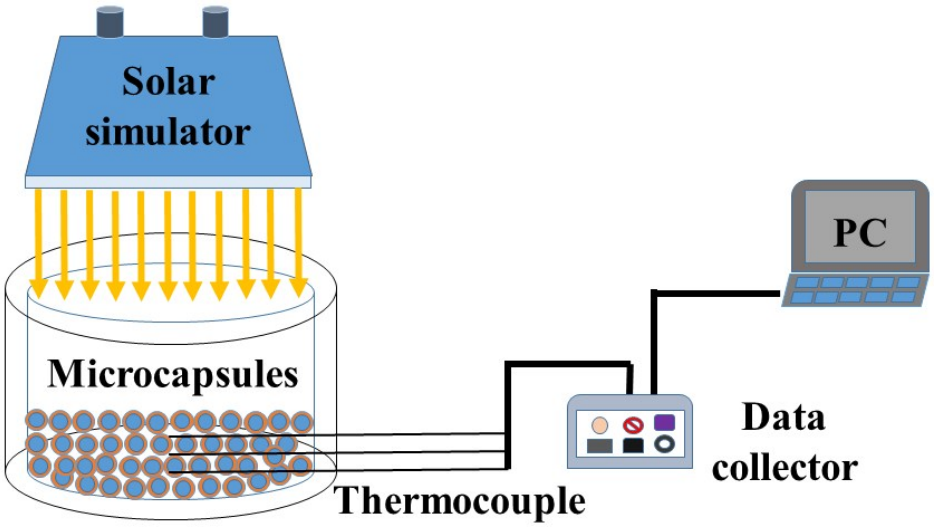

Figure S5 Schematic diagram of photo-to-thermal conversion device for microcapsules solid powders.

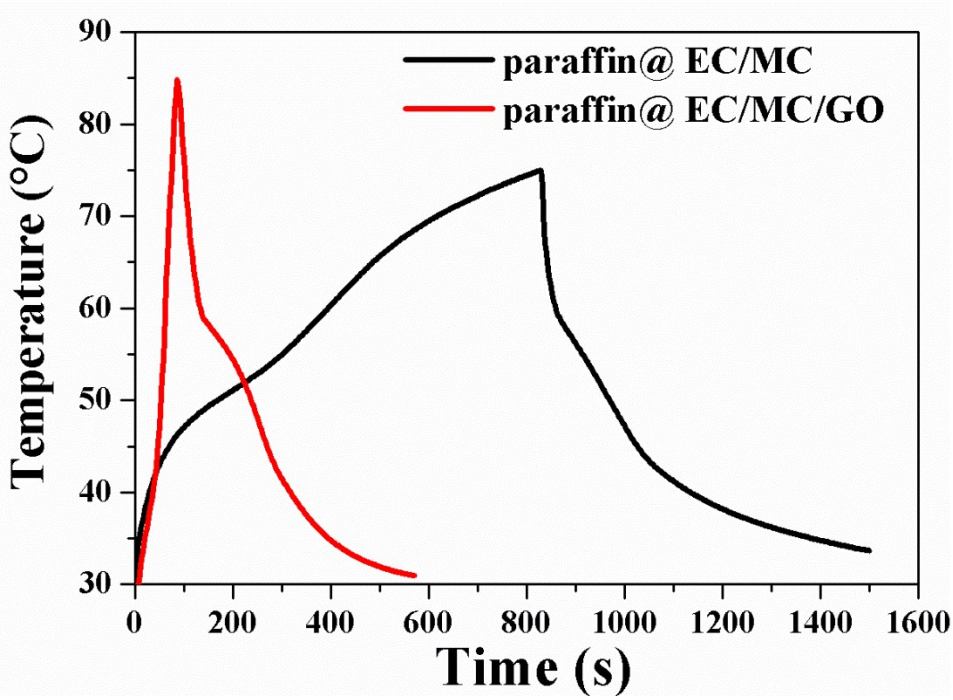

Figure S6 Photo-thermal performance of paraffin@ EC/MC composite and paraffin@ EC/MC/GO composite solid powders.

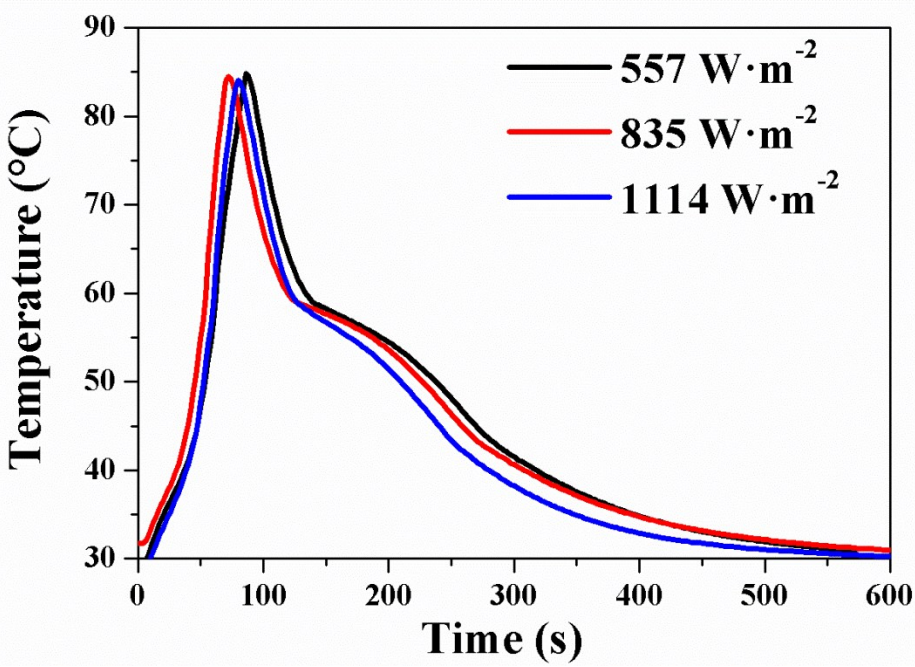

Figure S7 Photo-thermal performance of paraffin@ EC/MC composite and paraffin@ EC/MC/GO composite solid powders under different solar incident light.