Electronic Supplementary Information (ESI)

Direct synthesis of noble metal/graphene nanocomposites from graphite in water: photosynthesis

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Experimental Section

1. Materials

Graphite powder was purchased from SAMCHUN PURE CHEMICAL CO., LTD, Korea. Sodium dodecylsulfonate (SDS, 99+ %) and silver nitrate (AgNO3, 99 %) were obtained from Sigma-Aldrich and cetyltrimethylammonium bromide (CTAB, ≥99 %) from Sigma. Potassium tetrachloropalladate (II) (K2PdCl4), potassium tetrachloroplatinate (II) (K2PtCl4), and gold (III) chloride trihydrate (HAuCl4·3H2O, 99.9+ %) were purchased from Aldrich. Distilled water was used in the preparation of aqueous solution.

2. Synthesis of graphene flakes functionalized surfactants

In typical synthesis, 2 g of graphite powder was ultrasonicated with 50 ml of water for 1h. And then, the prepared graphite powder solution had stirred in 10 mM SDS and CTAB for overnight at roomtemperature.

3. Synthesis of noble metal/graphene composites

A typical experiment for the synthesis of noble metal/graphene composite was carried out by placing a vial containing the prepared graphene flakes solution in a sealed reactor where a conventional white-light is inside. After about 12 h, noble metal/graphene composites were formed.

4. Characterization

Transmission Electron Microscope (TEM) images were taken using an FEI Morgagni^{TM} electron microscope operated at an acceleration voltage of 300 kV. X-Ray diffraction (XRD) patterns were obtained with a Rigaku Ultima III diffractometer equipped with a rotating anode and a Cu-Kα radiation source (λ=0.15418 nm). Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES) were measured by the OPTIMA 5300DV, PerkinElmer (U.S.A). Raman spectra of the samples were measures using a x 50 objective using an excitation wavelength of 533 nm.

Fig. S1. Low-magnification TEM image of Pd/graphene composite functionalized with SDS.

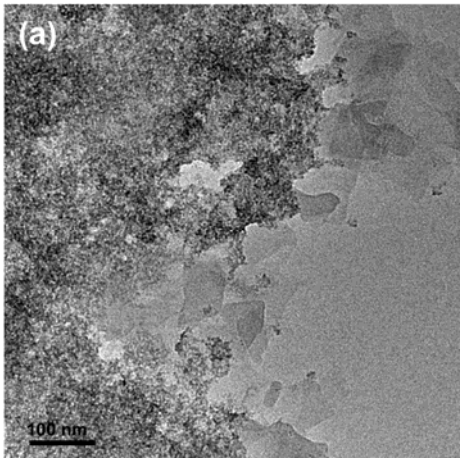


Fig. S2. TEM images of Pd/graphene composite synthesized without irradiant white-light

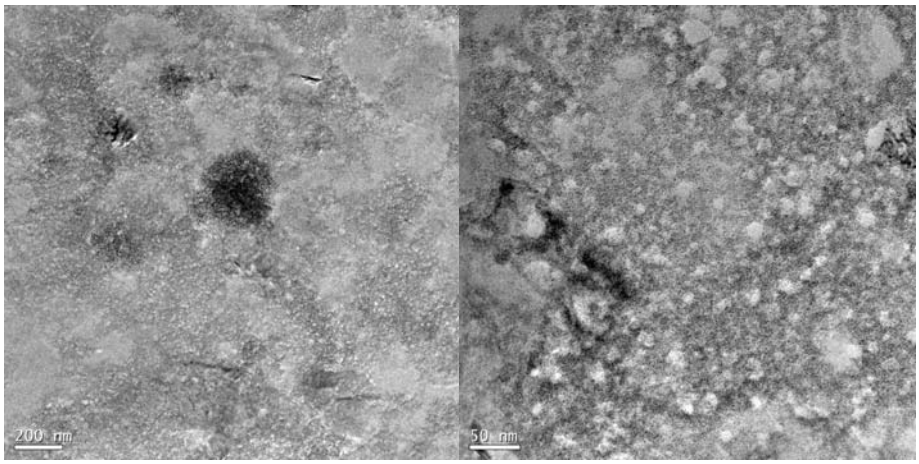


Fig. S3. TEM images of Pd/graphene composite synthesized at various conditions.

the different concentration of Pd ions; 5 mM (left) and 15 mM (right)

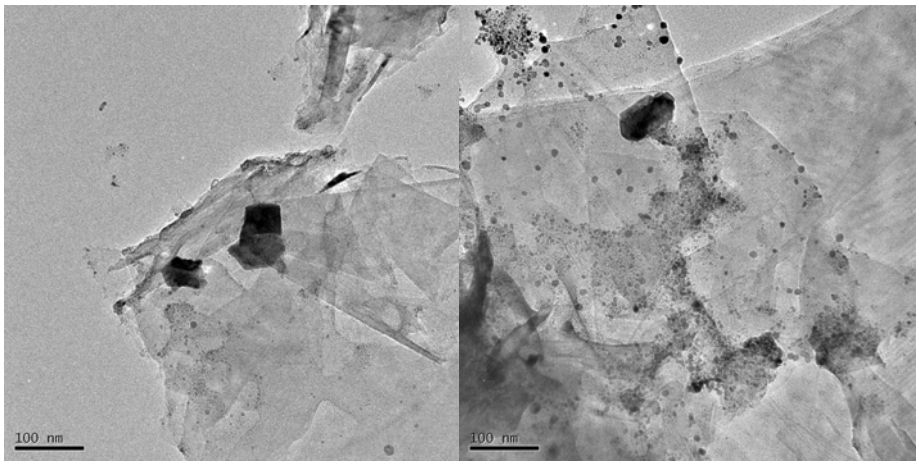
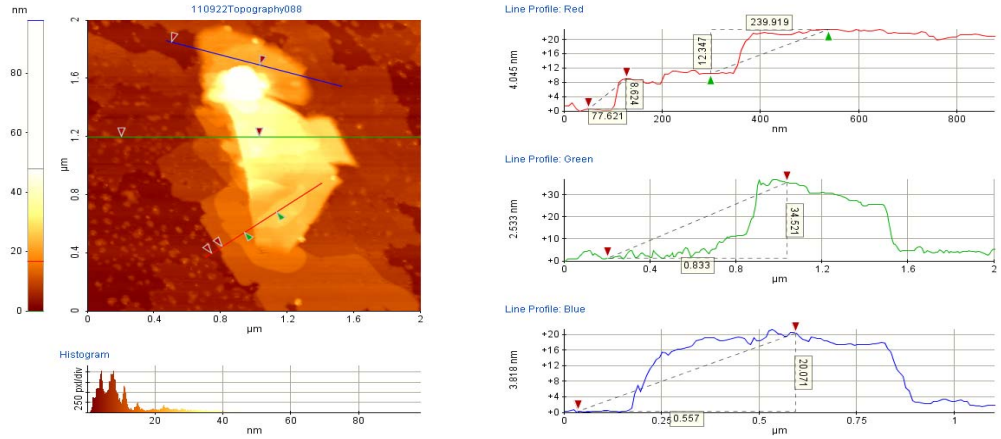


Fig. S4. AFM test of graphene functionalized SDS (a) and Pd/graphene composite.

(a)



(b)