Electronic Supplementary Information for

Photopolymerization of metal nanoparticles on multiwall carbon nanotubes

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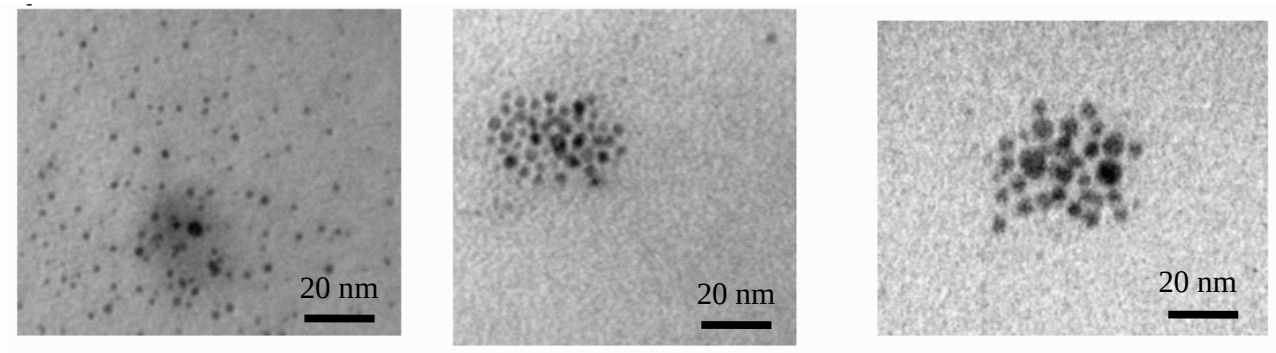
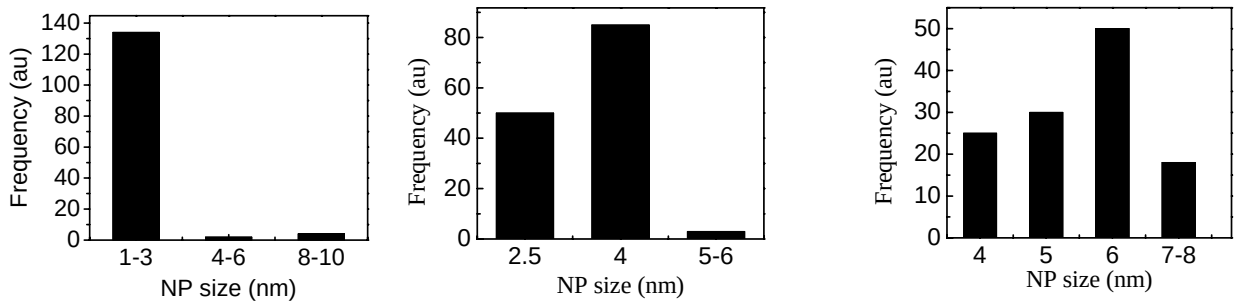
A. Synthesis and characterization of BTSAu and BTSAg

BTSH functionalized metal nanoparticles (BTSAu and BTSAg) were prepared using the modified Brust method.[1,2] An aqueous solution $HAuCl_4 \cdot 3H_2O$ or $AgNO_3$ (0.1 mmol) was added to a round-bottom flask. $N(C_8H_{17})_4Br$ (0.22 mmol) in to1uene solution was added with rapid stirring. A two-layer separation phase was formed. 0.2, 0.033 or 0.017 mmol BTSH was added to the solution based on the proposed nanoparticle size. The metal to thiol molar ratio was varied from 1:2, 3:1 to 6:l with respect to the target diameters of the nanoparticles. Then $NaBH_4$ aqueous solution (1.1 mmol) was added drop wise to the mixture with constant stirring. The color of the organic phase changed immediately to reddish-orange. With the addition of $NaBH_4$ the color changed deeply and finally became black/brown. Similar color changes were observed during the preparation of BTSAu and BTSAg, respectively. The reaction mixture was left open to react for about 12 hours while rapidly stirring. After the reaction, the organic phase was separated from the aqueous phase, and concentrated using rotavapor to ~5 mL. To this 5 mL was added 350 mL of 95% ethanol, and the mixture was kept in refrigerator over night to effect precipitation. The dark blackhrown precipitate was then filtered with polypropylene filter paper and washed with 95% ethanol. The product was then dried on

a vacuum pump. The nanoparticle was dissolved in toluene and sonicated. The UV absorption was also checked to make sure that no serious aggregation occurred. Since BTSAu and BTSAg are light sensitive, the reaction was carried out carefully in the dark. The BTSAu and BTSAg nanoparticles were detected and confirmed by Transmission Electron Microscopy (TEM) and Energy Dispersive X-ray (EDX), respectively, Figure S1 and S2.





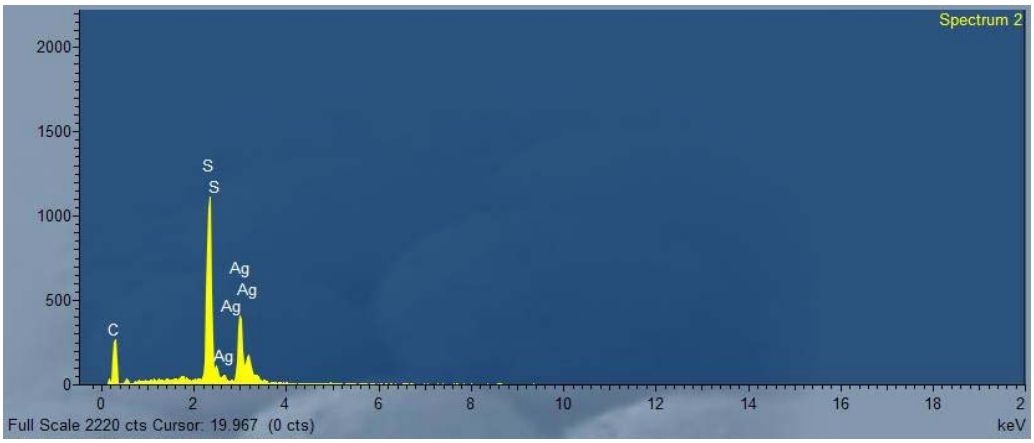


Figure S1. TEM images of BTSAg nanoparticles, nanoparticle size distribution, and EDX spectrum of 2-nm BTSAg nanoparticles (X-axis is energy in KeV and Y-axis is counting numbers).

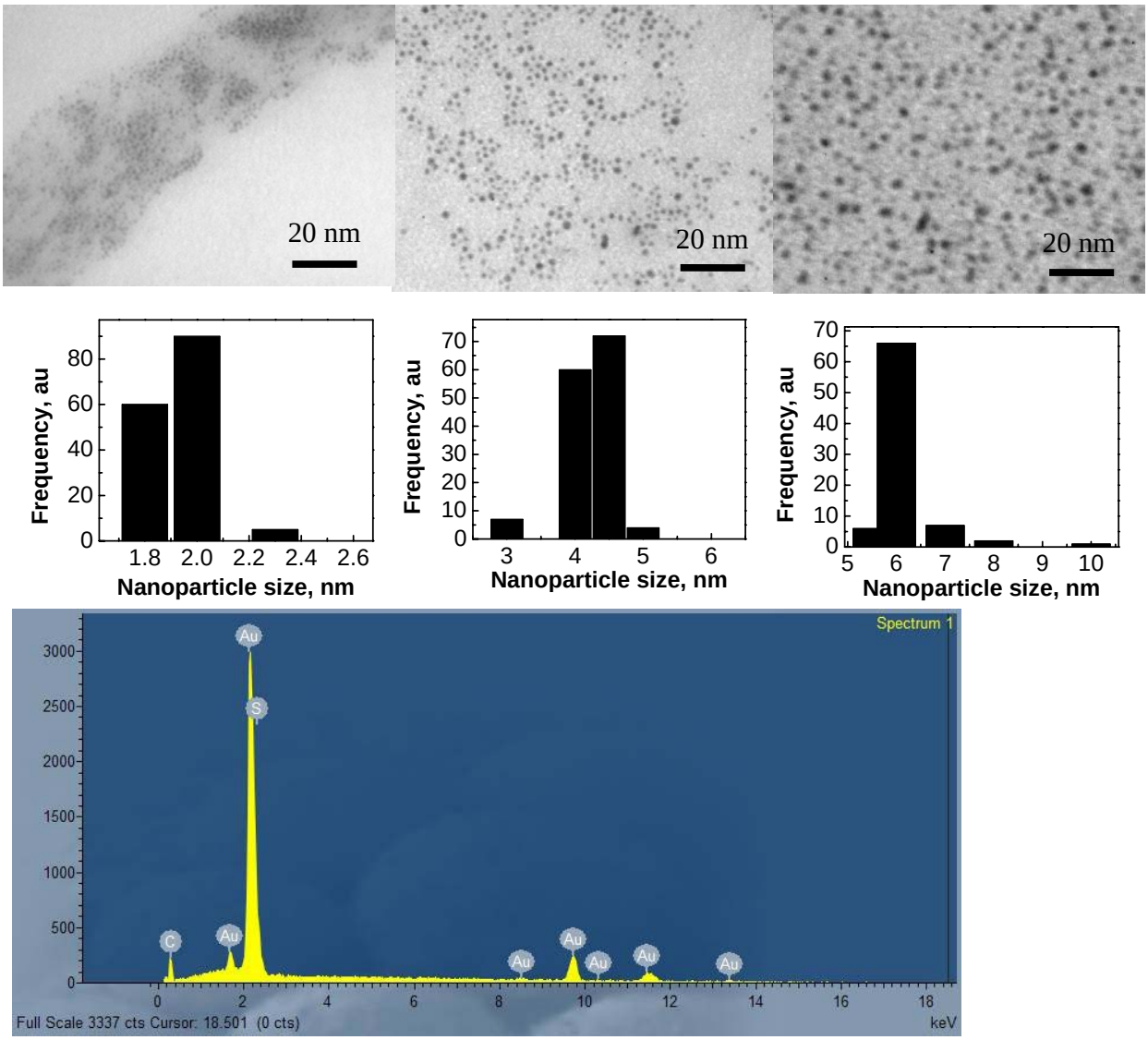


Figure S2. TEM images of BTSAu nanoparticles, nanoparticle size distribution, and EDX spectrum of 2-nm BTSAu nanoparticles (X-axis is energy in KeV and Y-axis is counting numbers).

B. SEM images of photopolymerization of 2-nm BTSAg and 2-nm BTSAu on the surface of MWCNT, and thickness distributions of MWCNT before and after irradiation.

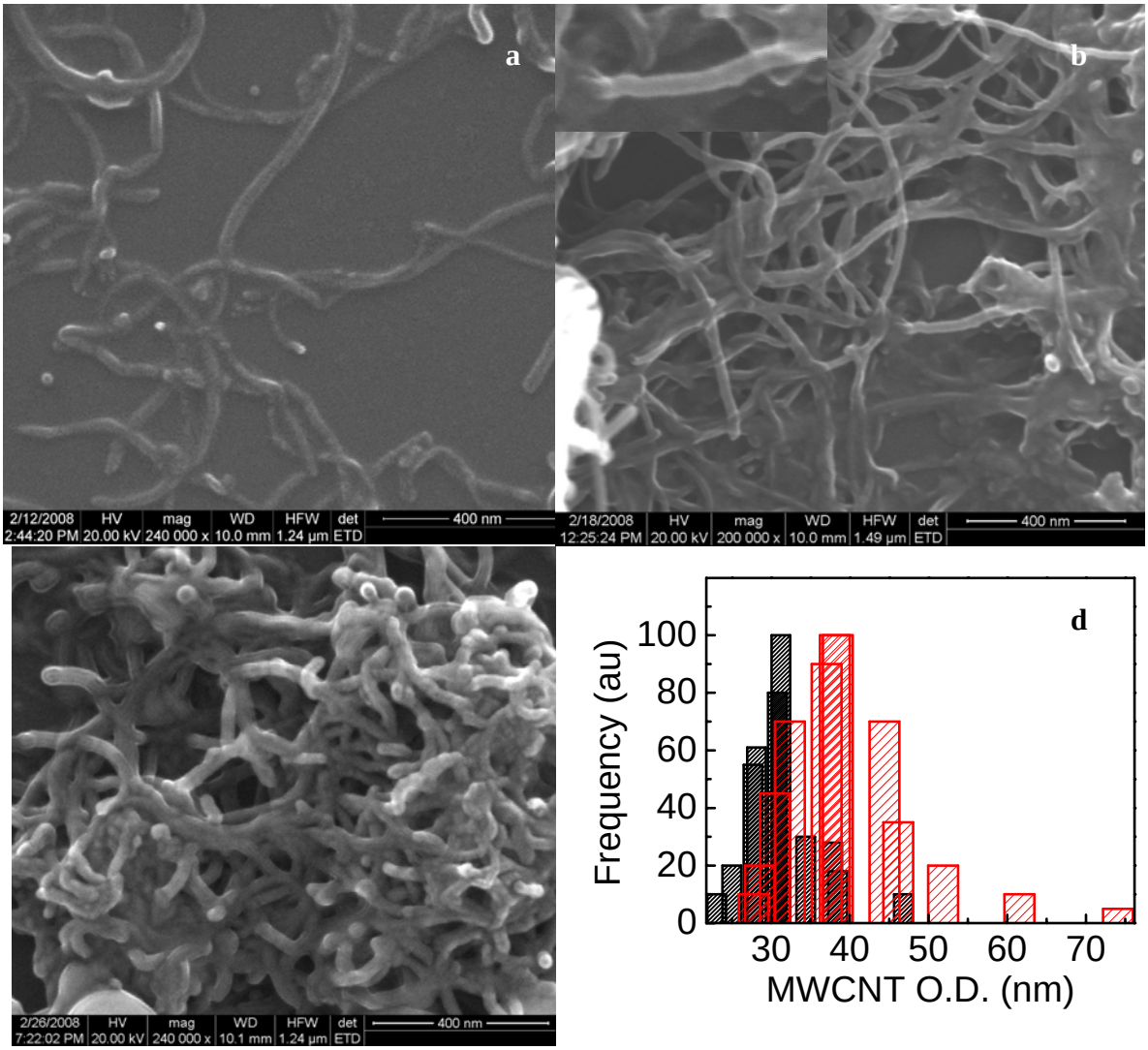


Figure S3. SEM images of 2-nm BTSAg nanoparticles with UV absorption value of ~1.0 at 350 nm in the presence of MWCNT before (a) and after (b) 350-nm lamp irradiation. (c) 2-nm BTSAu in the presence of MWCNT after 350-nm lamp irradiation. (d) Thickness distributions of MWCNT without (black column) and in the presence of 2-nm BTSAu (red column) after UV irradiation. The MWCNT became ragged after the UV

irradiation which indicated that MWCNT was covered by polymerized BTSAg or BTSAu.

Notes and references

(1) M. Brust, M. Walker, D. Bethell, D. J. Schiffrin, R. Whyman. *J. Chem. Soc., Chem. Commun.* 1994, 801.

(2) D. V. Leff, P. C. Ohara, J. R. Heath, W. M. Gelbart. *J. Phys. Chem.* 1995, **99**, 7036.