

Functionalized hBN nanosheets using the ultrasonic-assisted liquid phase exfoliation and decorate of their surface with gold nanoparticles

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Hexagonal boron nitride nanosheets exhibit excellent properties including high hardness, high mechanical strength, and exceptional thermal stability and have an excellent potential in fields such as catalysis, electronics, coatings, sensing, and water cleaning (1). The hBN nanosheets were obtained by the liquid phase exfoliated ultrasonic-assisted of bulk hBN using a deionized water- isopropanol mixture. While the amino-functionalization of the hBN nanosheets was carried out using hydrazine as functionalization agent. The formation of gold nanoparticles on the surface nanosheets was carried out in colloidal solution without used reducing or stabilizing agents additional. The hBN nanosheets decorated with gold nanoparticles were characterized by transmission electron microscopy (TEM), X-ray diffraction (XRD), infrared (IR) spectroscopy and ultraviolet visible (UV-Vis) spectroscopy. TEM results confirmed the formation of gold nanoparticles with an average diameter of 20 nm on the hBN nanosheets. While UV-Vis spectrum of the Au-decorated hBN nanosheets revealed the presence of an absorption band around at 515 nm associated to the surface plasmon resonance of gold nanoparticles. XRD patterns revealed the hexagonal phase of the hBN nanosheets and face-centered cubic of the gold nanoparticles. Finally, IR spectra revealed the typical absorption bands of $-NH_2$ groups due to the functionalization of the hBN nanosheets.

References

- [1] A. R. Deshmukh, J. W. Jeong, S. J. Lee, G. U. Park, and B. S. Kim, *ACS Sustain. Chem. Eng.*, vol. 7, no. 20, pp. 17114–17125, Oct. 2019.

Figures

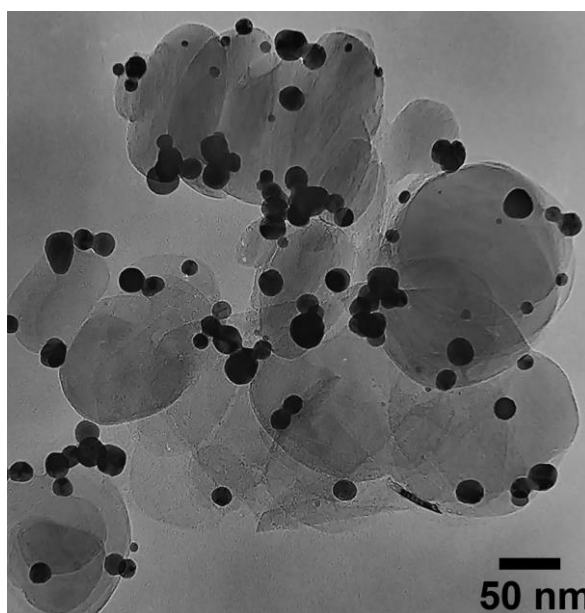


Figure 1: TEM image of amino-functionalized hBN nanosheets decorated with gold nanoparticles.