Synthesis of Core-shell Nanostructure Graphene Oxide-Vortex rings (GO-VRs) for Heavy Metal Purification

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Abstract

Heavy metals pollution is a serious environmental concern with purification challenges. Recently, graphene-based nanomaterials scrutinized to be an efficient candidate for the remediation of heavy metals because of their natures and distinctive properties. In this study, a unique process for generating 3 dimensional assemblies of graphene oxide in a cationic aqueous surfactant (CTAB) system is represented, which ultimately turned into a core shell structure featuring graphene oxide vortex rings (GO-VRs) aerogel after freeze drying process. Based on the different parameters like concentration of GO and CTAB solution, impact velocity various shape of GO-VRs can be derived such as spheres, donuts, and jellyfish. This synthesized GO-VRs has been characterized by Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM). In comparison to other reported adsorbents, the obtained core shell structure GO-VRs reveals superior adsorption capacity for the remediation of pollutants like heavy metals from wastewater. Particularly, the adsorption efficiency of core shell GO-VRs for chromium (Cr) is much higher and it can be regenerated and reused in adsorption-desorption cycles without significant loss of adsorption capacity. Therefore, this study may bestow potential strategies for the development of such superb adsorbents in the future.

References

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[2] An, D., et at., Nature communications, 7 (2016): p. 12401

Figures

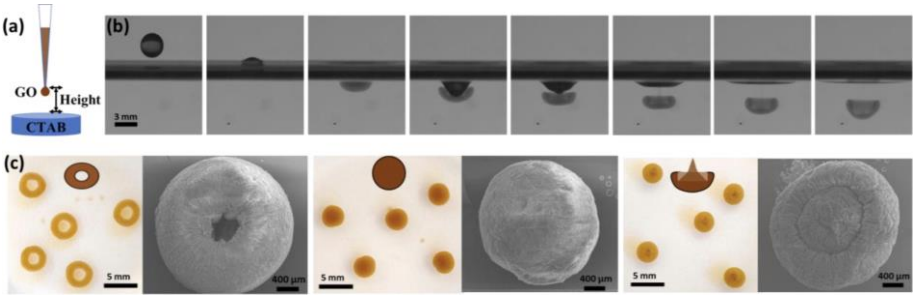

Figure 1: GO-VR phase diagrams (a) Schematic illustration of the GO-VR fabrication set-up. (b)High speed photographic images of a GO droplet penetrating CTAB solution and formation of a vortex ring. (c) Optical and SEM images of donut, spherical and jellyfish morphologies of GO-VR.