

Interaction between Graphite Oxide and Sand Granules: The Effect of Temperature

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Abstract

Graphite oxide (GO) coated sand composites were used to remove contaminants in water. We used GO coating on the sand by heat treatment without adding a binder. GO was synthesized by improved Hummer's method. The GO was then coated on acid-purified sand as a function of system temperature for 2 hr (i.e., 50, 90, 110, 130, 150, 180, 250, and 300 °C). Repeated coating of graphite oxide onto sand granules at different temperatures resulted in a composite with enhanced stability in water. Raman, FTIR, XRD, and SEM analyses were used to characterize the composites and other precursors used. The characteristic D and G bands of GO are observed at 1350 cm⁻¹ and 1595 cm⁻¹, respectively, in GO and GO sand composites. With the heating of the reaction system, the G band position redshifts and reaches an optimal at 120 °C. The redshifts indicate the reduced number of GO layers on the sand. However, the higher stability of GO on the sand was maximized at 110 °C and the lowest $\frac{I_D}{I_G}$ ratio was observed at 180 °C. The Raman spectra confirmed that GO is present on the sand surface. Turbidity data confirmed the stability of GO sand composites. The exact reasoning for these observations is not fully resolved yet.

Keywords: *Graphite Oxide, nature of the interaction, sand, temperature variation*

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