

Flake size-dependent adsorption of graphene oxide aerogel

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ABSTRACT

In this work, the flake size-dependent adsorption kinetics of graphene oxide (GO) aerogel is studied. GO in different flake sizes are produced by sonication prior to the preparation of aerogel through freeze-dry method. The structural characterizations reveal that GO aerogel with smaller flake size possesses higher surface area and higher intensity of edge-plane oxygen functionalities. These provide more adsorption sites and active sites for heavy metal ions adsorption. Adsorption study reveals the higher Fe³⁺ ions adsorption capacity as well as uptake rate on GO aerogel with smaller flake size. The adsorption kinetic obeys the pseudo-second-order kinetic model which indicates the chemisorption is the rate-determining step. Adsorption isotherms of GO aerogel on Fe³⁺ ions show highest Langmuir adsorption capacity of 133.3 mg/g and render it to be a potential material for heavy metal ions removal in wastewater treatment.

Keywords: Aerogel: Graphene: Hydroxyl groups: Sheet size: Water treatment