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# Preparation, Characterization, and Application of Mesoporous Silica-Grafted Graphene Oxide for Highly Selective Lead Adsorption

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**Abstract:**

A new graphene-based adsorbent material for Pb(II) ions, mesoporous silica (SBA-15)-grafted graphene oxide (GO-SBA-15), was synthesized by covalently binding graphene oxide to SBA-15. The features of the material were characterized using scanning electron microscopy (SEM), X-ray diffraction (XRD), and Fourier transform infra-red (FT-IR) spectroscopy. A series of adsorption experiments were conducted at room temperature to investigate the adsorption behavior of Pb(II) ions on GO-SBA-15. The results show that the maximum adsorption can be rapidly achieved (within 10 min) over a broad pH range (4–7). The maximum adsorption capacity of GO-SBA-15 for Pb(II) is 255.10 mg/g at a pH of 5. GO-SBA-15 can selectively adsorb more than 99% of Pb(II) ions in the presence of Li(I), Na(I), K(I), Ca(II), Mg(II), Cd(II), Cr(III),Co(II), Hg(II), As(III), Mn(II), Ni(II), and Zn(II) ions. Adsorption isotherms and kinetic studies suggest that the sorption proceeds as monolayer coverage and is controlled by chemisorption. The real-world application of GO-SBA-15 was also tested using real samples. This study indicates that GO-SBA-15

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