

Synthesis and characterization of amine-functionalized amorphous silica nanoparticles equipped with uniform nanopores for selective adsorption of heavy metal ions from aqueous solution

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Amorphous silica nanoparticles (ASNs) are one of the most common nanomaterials being used in many applications including industrial manufacturing and composite materials due to their favorable physicochemical properties. Because of their excellent biocompatibility, facile synthesis, and relatively easy surface modification and labeling, ASNs are being developed for various biomedical and pharmaceutical application.

We have synthesized amine-functionalized ASNs equipped with nanopores. As-prepared ASNs and nanoporous ASNs have been characterized by transmission electron microscopy(TEM), scanning electron microscopy(SEM), powder X-ray diffraction(XRD), Fourier transform infrared spectroscopy(FT-IR), X-ray photoelectron spectroscopy(XPS). Preliminary results demonstrate that ASNs has a high selectivity of adsorbing Cr(VI) metal ions compared to unfunctionalized ASNs nor ASNs with no nanopores. These results on the formation and chemical functionalization of ASNs equipped with nanopores, as well as potential applications for removing heavy ions from aqueous solutions will be discussed in the presentation.