Selective Adsorption of Aqueous Boron on Carbonized PAN (polyacrylonitrile) Electrospun Nanofibers

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The recovery of boron from seawater has become feasible economically to its mineral deposits just recently. However, it is very promising considering its rapidly increasing uses, including glass, ceramics, semiconductors, detergents, fertilizers, and textiles. The general strategy to adsorb aqueous boron as the form of boric acid ($B(OH)_3$) is providing hydroxyl(-OH) ligand sites on adsorbent materials and rendering aqueous boron tied up on the surface by consecutive dehydration reactions. Here we have proposed carbonized PAN (polyacrylonitrile) electrospun nanofibers for adsorbent materials of aqueous boron. The presence of nitrogen in PAN nanofibers is expected to form a surface like N-doped graphene oxide via carbonization, and the nitrogen sites on the surface in aqueous solution are hydrolyzed to provide hydroxyl ligands. The XPS (X-ray photoelectron spectroscopy) has been employed to determine the adsorption of aqueous boron on carbonized PAN nanofibers by the peak deconvolution for each component. In addition, the adsorption of aqueous boron was visualized by the calculation of energetics using computational chemistry.