Functionalized Nanoporous Silica for Highly Selective Sensing of Metal Ion in Water

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In this study, after self-assembly and hydrothermal reaction under acidic conditions using TEOS as a silica source and a triblock copolymer (P123) as a template, a nanostructured silica material (As-synthesized SBA-15) with two-dimensional (2D) hexagonal symmetry successfully was synthesized. The templates in nanopores were removed in HCl-EtOH solution through a solvent extraction method (Surfactant-extracted SBA-15). A process of attaching functional groups is required to functionalize the nanopores from which the template has been removed. Therefore, after modifying the surface of the nanopores with a high array in the silica material (AAPDMS-SBA-15) with aminosilane groups, Tb/AAPDMS-SBA-15 was generated through complexation of Tb2+ and aminosilane. Various heavy metal ions were adsorbed to confirm the degree of sensing for each metal ion by photoluminescence spectroscopy. As a result, the functionalized silica material showed high selective sensing for Cu2+ in aqueous solution.

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