

A novel amine modified double-walled silica nanotube for adsorption of Cu^{2+} in aqueous solution

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Double-walled silica nanotube (DWSNT) was utilized as a potential material such as catalysis, adsorbent and sensor. In this study, DWSNT which is surface modified by amine (primary(1°), secondary(2°), tertiary(3°) amines) was applied to adsorb Cu^{2+} in aqueous solution. The mechanism of $\text{Cu}(\text{OH})_2$ crystals growth was imply that the reaction between complex Cu^{2+} and OH^- dissociated from water on the surface of amine functionalized DWSNT. The adsorbed Cu^{2+} was analyzed by inductively coupled plasma (ICP) and the capacity of adsorption shows following order: 1° amine > 2° amine > 3° amine. The growth of $\text{Cu}(\text{OH})_2$ crystals was investigated by X-ray diffraction (XRD) for determination of the mechanism. Also, Field emission gun scanning electron microscopy (FEG-SEM) and high-resolution transmission electron microscopy (HR-TEM) are used to show the internal-external structures of DWSNT. The modified DWSNT by crystallization technique shows a potential application in various fields.