Spherical Tin Oxide, SnO2 Particles Fabricated via Facile Hydrothermal Method for Detection of Mercury (II) Ions.

ABSTRACT

Smooth-surface spherical tin oxide particles were fabricated via hydrothermal processing route. X-ray diffraction (XRD) revealed that the particles consisted of the rutile phase of SnO2 with tetragonal structure. The spherical morphology was realized with the aid of ammonia. The aggregation of SnO2 particles could be avoided by adjusting the concentration of tin (II) chloride. Bare glassy carbon electrode (GCE) was modified with the hydrothermally prepared SnO2 particles to detect the presence of mercury (II) ions (Hg2+), in the presence of potassium chloride (KCl) as a supporting electrolyte. GCE modified with the spherical SnO2 particles that possessed small crystallite size and smooth surface exhibited significantly enhanced oxidative and reductive current of Hg2+ during cyclic voltammetry compared with its bare counterpart. The reductive current was observed to increase by two fold and the detection limit of 75 nM for Hg 2+ was achieved. This suggests that SnO2 particles are a promising chemical sensor for the detection of Hg2+ in natural waters.

Keyword: Detection limit; Hydrothermal; Mercury; Tin oxide; Voltammetry.