SONOELECTROCHEMICAL SYNTHESIS OF MONOMETALLIC AND BIMETALLIC NANOPARTICLES

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ABSTRACT

Noble monometallic and bimetallic nanoparticles have a wide spectrum of applications such as catalysis, sensors, microcontrollers etc. There are many different methods that are used in order to create/synthesize nanoparticles. In this work we demonstrate the synthesis of monometallic and bimetallic nanoparticles via pulsed sonoelectrochemistry. Specifically, such nanoparticles have been synthesized using pulsed current and/or pulsed sonication [1-6]. Current density defines the shape and size of the nanoparticles that are created while the sonication time enhances the dispersion and the mass transport of the nanoparticles [2]. An ultrasound emitter is used which is connected with the electrochemical cell and is considered the cathode (sonotrode). This method applies to different kinds of solutions which have dissolved metal salts or even solutions with dissolved bulk substrates of the desirable metal/metals. The solutions may also have some stabilizers in order to control the dispersion and avoid the agglomeration of the nanoparticles [3]. The parameters that affect the quality and the quantity of the created nanoparticles are the temperature of the experiment, the current density that is applied, the sonication time and the concentration of the stabilizers. In this work the synthesis of monometallic Ag and bimetallic Ag@Au nanoparticles is presented.

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