Controllable Synthesis of Silver Nanoparticles by the Pulsed Electrochemical Deposition in a Forced circulation Reactor

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A novel pulsed electrochemical system was constructed to synthesize size-controllable spherical AgNPs in the aqueous phase. The circulation system was found to greatly reduce silver deposition rate, thereby making well-dispersed AgNPs colloids to be synthesized very convenient without ultrasonication and string system. Moreover, the particle size of AgNPs were controlled by the experimental parameters (on-time, off-time, and peak current) to improve homogeneity of the prepared AgNPs. The smallest sized AgNPs with a size of 14.9 ± 4 nm were obtained with an on-time, off-time, and peak current of 0.8 ms, 0.3 ms, and 0.2 A, respectively. In addition, a clear linear positive correlation between the size of silver nanoparticles and the peak current was found in this system.

Keywords: Silver nanoparticles; Controllable synthesis; Pulsed electrochemical system

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