

A Study on the Continuous Synthesis of Silver Nanoplates through the Reactor: Continuous Stirring Tank Reactor

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Compared with batched synthesis method, continuous synthesis method can achieve mass production of nanomaterial to satisfy the increasing demand in industries. Here, the continuous stirring tank reactor (CSTR) has been studied for synthesis of silver (Ag) nanoplates. The Ag nanoplates were synthesized by the reaction of silver precursor with H₂O₂ in the presence of PVP in the alkaline condition. In operation of CSTR, the silver precursor solution and H₂O₂ solution were transported into the CSTR at a designed flow rate by pump. The influences of agitation speed, molar ratio of AgNO₃ to NaCl, and reagent concentration on the size of nanoplates have been investigated. By comparing the size of Ag nanoplates synthesized in CSTR and batch reactor, the size of the Ag nanoplates in the batch reactor was inversely related to the agitation speed, while Ag nanoplates synthesized using CSTR was larger than nanoplates synthesized using batch reactor in the same experimental conditions. The main reason would be ascribed that CSTR has good performance to maintain a lower reagent concentration and provide sufficient monomer concentration, which is more favorable to growth of anisotropic structure.