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Morphological evolution of copper nanoparticles: microemulsion reactor system versus batch reactor system

Ming Xia¹, Zengmin Tang¹, Woo-Sik Kim, Taekyung Yu*, Bum Jun Park*

Department of Chemical Engineering, College of Engineering, Kyung Hee University, Yongin, 17104, South Korea.

tkyu@khu.ac.kr (T. Yu)

bjpark@khu.ac.kr (B. J. Park)

*Corresponding author.

Abstract

In the synthesis of nanoparticles, the reaction rate is important to determine the morphology of nanoparticles. We investigated morphology evolution of Cu nanoparticles in this two different reactors, microemulsion reactor and batch reactor. In comparison with the batch reactor system, the enhanced mass and heat transfers in the emulsion system likely led to the relatively short nucleation time and the highly homogeneous environment in the reaction mixture, resulting in suppressing one or two dimensional growth of the nanoparticles. We believe that this work can offer a good model system to quantitatively understand the crystal growth mechanism that depends strongly on the local monomer concentration, the efficiency of heat transfer, and the relative contribution of the counter ions (Br^- and Cl^-) as capping agents.

Keywords: A1. Crystal structure, A1. Growth model, A2. Crystal growth from solution, B1. Cuprates, B1. Metals

¹ These authors contributed equally to this work.

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