

Synthesis of Copper Sulfide Nanocrystals in batch and continuous operation: Effect of flow motion in continuous operation

Zengmin Tang, 김우식^{1,†}, 유태경²

경희대학교; ¹경희대학교 화학공학; ²경희대학교 화학공학과
(wskim@khu.ac.kr[†])

Influence of flow motion on morphology and structure of Copper sulfide nanocrystals produced by Cu²⁺/BPEI-sulfur reaction in the presence of ascorbic acid was studied using mixing tank (MT) crystallizer and Couette-Taylor (CT) crystallizer in batch and continuous operation. In batch operation, only Cu₇S₄ nanocrystal with morphology of fiber was obtained when the agitation speed was at range of 50-1000 rpm in MT crystallizer. In continuous operation, the mean residence time was set at 2.5 min and keeping the same condition with batch operation, pure Cu₇S₄ nanocrystal with hexagonal plate could be synthesized in CT crystallizer and MT crystallizer when the rotating speed was or greater than 90 rpm, while the morphology of Cu₇S₄ would change to the fiber when the rotating speed was or less than 80 rpm. If the rotation speed continuously reduced down to 5 rpm, new pure nanocrystal Cu₃₉S₂₈ was appeared in CT crystallizer. On the basis of morphology and composition change, the flow motion in CT crystallizer and MT crystallizer had a significant effect on morphology and structure of copper sulfide in this continuous operation.