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Continuous Purification of Colloidal Quantum Dots in Large-Scale Using Porous Electrodes in Flow Channel HOSUB LIM, Sungkyunkwan Univ, JU YOUNG WOO, DOH CHANG LEE, Korea Advanced Institute of Science and Technology (KAIST), JINKEE LEE, Sungkyunkwan Univ, SOHEE JEONG, DUCKJONG KIM, Korea Institute of Machinery and Materials (KIMM) — Colloidal Quantum dots (QDs) afford huge potential in numerous applications owing to their excellent optical and electronic properties. After the synthesis of QDs, separating QDs from unreacted impurities in large scale is one of the biggest issues to achieve scalable and high performance optoelectronic applications. Thus far, however, continuous purification method, which is essential for mass production, has rarely been reported. In this study, we developed a new continuous purification process that is suitable to the mass production of high-quality QDs. As-synthesized QDs are driven by electrophoresis in a flow channel and captured by porous electrodes and finally separated from the unreacted impurities. Nuclear magnetic resonance and ultraviolet/visible/near-infrared absorption spectroscopic data clearly showed that the impurities were efficiently removed from QDs with the purification yield, defined as the ratio of the mass of purified QDs to that of QDs in the crude solution, up to 87%. Also, we could successfully predict the purification yield depending on purification conditions with a simple theoretical model. The proposed large-scale purification process could be an important cornerstone for the mass production and industrial use of high-quality QDs.

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