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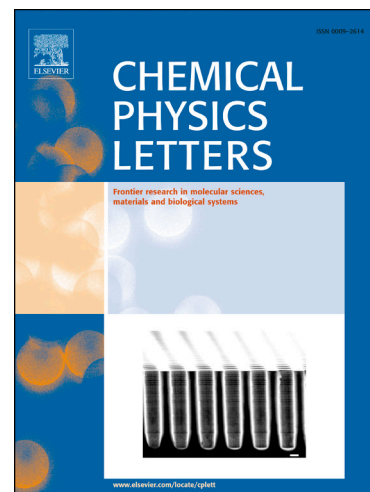
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# Synthesis of manganese-doped silver selenide quantum dots with near-infrared photoluminescent and paramagnetic properties

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## Abstract

Water-dispersible Mn<sup>2+</sup>-doped Ag<sub>2</sub>Se QDs were synthesized by solvothermal reaction of silver and manganese salts with selenium source and subsequent ligand exchange. The Mn doping level could be tuned by changing the feed amount of the Mn precursor. The Mn<sup>2+</sup>-doped Ag<sub>2</sub>Se QDs had a crystal structure typical of monoclinic  $\alpha$ -Ag<sub>2</sub>Se. At the Mn doping level of 0.28 %, the photoluminescence quantum yield at 1130 nm remained at 5.7 %. Moreover, EPR spectrum and VSM result suggest paramagnetic characteristics of the 0.28 % doped QDs. Cytotoxicity test indicates good biocompatibility of the Mn<sup>2+</sup>-doped Ag<sub>2</sub>Se QDs, which have great potential for biomedical imaging.

Key words: nanocrystalline materials; silver selenide QDs; manganese doping; NIR-II photoluminescent; paramagnetic

## 1. Introduction

Semiconductor quantum dots (QDs) have been developing rapidly during the past decade for their

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