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Encapsulation of ZnS:Mn2+ Nanoclusters with PS-PVP Diblock Copolymer SANGCHEOL KIM, FRÉDÉRIC S. DIANA, PIERRE M. PETROFF, EDWARD J. KRAMER, Materials Department and MC-CAM, UCSB, TAKESHI OTSU, TOMOHIDE MURASE, Mitsubishi Chemical Group Science and Technology Research Center, Inc — ZnS colloidal quantum dots (QDs) were synthesized in a mixture of highly coordinating solvents and doped with Mn^{2+}. In this study, we report on the possibility of assembling the block copolymer around the QDs and seek to optimize the electronic properties of the QDs. When the QDs in toluene were mixed with PS-PVP (141 kg/mol, $f_{PVP} = 0.059$), the inverse micelle formation was induced over 2.5 mg/mL of PS-PVP. The solution was deposited onto a silicon substrate and the distribution of the micelles was observed by SFM. For Mn-doped ZnS nanoparticles, emission in the blue is observed at 404 nm due to sulfur vacancies on the surface and the energy transfer from the band-to-band excitation in ZnS to the Mn^{2+} ion is also facilitated due to the quantum confinement effect, resulting in orange emission (582 nm) associated with the $^4T_1$ to $^6A_1$ [Mn^{2+}]-based transition. By adding PS-PVP to a ZnS:Mn/toluene solution, the intensity ratio of blue to orange emission decreases slowly and drops around 0.1 mg/mL.

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