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Mn^{2+}-Doped CdSe/CdS Core/Multishell Colloidal Quantum Wells Enabling Tunable Carrier-Dopant Exchange Interactions[1] SAVAS DELIKANLI, Bilkent University, THOMAS SCRACE, JOSEPH MURPHY, BIBLOP BARMAN, YUTSUNG TSAI, PEIYAO ZHANG, State University of New York, University at Buffalo, PEDRO LUDWIG HERNANDEZ-MARTINEZ, Nanyang Technological University, JOSEPH CHRISTODOULIDES, Naval Research Laboratory, ALEXANDER N. CARTWRIGHT, ATHOS PETROU, State University of New York, University at Buffalo, HILMI VOLKAN DEMIR, Nanyang Technological University — We report the manifestations of carrier-dopant exchange interactions in colloidal Mn^{2+}-doped CdSe/CdS core/multishell quantum wells. In our solution-processed quantum well heterostructures, Mn^{2+} was incorporated by growing a $Cd_{0.985}Mn_{0:015}S$ monolayer shell on undoped CdSe nanoplatelets using the colloidal atomic layer deposition technique. The carrier-magnetic ion exchange interaction effects are tunable through wave function engineering. This is realized by controlling the spatial overlap between the carrier wave functions with the manganese ions through adjusting the location, composition, and number of the CdSe, $Cd_{1-x}Mn_xS$, and CdS layers. Our colloidal quantum wells, which exhibit magneto-optical properties analogous to those of epitaxially grown quantum wells, offer new opportunities for solution-processed spin-based semiconductor devices.

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Savas Delikanli
State Univ of NY - Buffalo

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