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Efficient Exciton Transfer from an Epitaxial Quantum Well to an Energy Gradient Structure Composed of Layer-by-Layer Assembled Colloidal Quantum Dots SEDAT NIZAMOGLU[1], Bilkent University, PEDRO LUDWIG HERNANDEZ MARTINEZ, Bilkent University, Nanyang Technological University, EVREN MUTLUGUN, Bilkent University, HILMI VOLKAN DEMIR, Bilkent University, Nanyang Technological University — In this work, we study exciton migration from a violet-emitting epitaxial quantum well (QW) to an energy gradient structure that consists of layer-by-layer assembled, green- and red-emitting quantum dot (QD) bilayer. In the experimental study, the energy gradient of these green and red QDs provides an increase of 64.2% in the exciton transfer efficiency with respect to the bilayer of only red-emitting QDs. These results suggest that the energy difference between the QD layers significantly boosts the QW-QD exciton transfer rate compared to the mono-dispersed case. To support this experimental observation, we propose a theoretical model based on optical near field and density matrix to investigate the effects of energy difference between the QD layers. The strong exciton transfer from the epitaxial QWs to the colloidal QDs is essential to the energy efficiency of hybrid optoelectronic devices [1-3].

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