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Optical characterizations of one-dimensional wetting layers in InGaAs/GaAs quantum dot chains XIAOYONG WANG, CHIH-KANG SHIH, Department of Physics, the University of Texas at Austin, ZHIMING WANG, GREGORY SALAMO, Department of Physics, University of Arkansas — We report spectroscopic evidence for the formation of 1D wetting layers (WLs) during the Stransky-Krastanov (SK) growth of multi-layered InGaAs/GaAs quantum dot (QD) chains. The wire-like features of these 1D WLs were demonstrated by their 1D density of states as well as the anisotropic absorption and emission properties. Two groups of QD's were found sitting on these 1D and the traditional 2D WLs, respectively, with size-dependent polarization anisotropies of ∼6%-25% due to their elongated shapes. The previously-unexplored new SK growth mode of 1D WLs could be potentially tailored by varying the In content and barrier thickness to yield QD's and 1D WLs with expected energy level separations. This may lead to the efficient carrier transfer between QD's on top of the same 1D WL for quantum technology applications that require quantum information transfer between different nanostructures of controlled positioning.

Xiaoyong Wang
Department of Physics, the University of Texas at Austin

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