Abstract Submitted
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Valley Polarization in Size-Tunable Monolayer Semiconductor Quantum Dots[1] GUOHUA WEI, Applied Physics Program, Northwestern University, DAVID A. CZAPLEWSKI, IL WOONG JUNG, Center for Nanoscale Materials, Argonne National Lab, ERIK J. LENFERINK, TEODOR K. STANEV, NATHANIEL P. STERN, Department of Physics, Northwestern University — Controlling the size of semiconductor nanostructures allows manipulation of the optical and electrical properties of band carriers. We show that laterally-confined monolayer MoS_2 quantum dots can be created through top-down nanopatterning of an atomically-thin two-dimensional semiconductor. Semiconductor-compatible nanofabrication processing allows for these low-dimensional materials to be integrated into complex systems that harness their controllable optical properties. Size-dependent exciton energy shifts and linewidths are observed, demonstrating the influence of quantum confinement. The patterned dots exhibit the same valley polarization characteristics as in a continuous MoS_2 sheet, suggesting that monolayer semiconductor quantum dots could have potential for advancing quantum information applications.

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