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Shreedhar Raj Kandel, Zhoufeng Jiang, Simeen Khan, Sailendra Chiluwal, Liangfeng Sun SHREEDHAR KANDEL, ZHOUFENG JIANG, SIMEEN KHAN, SAILENDRA CHILUWAL, LIANGFENG SUN, BGSU — Colloidal nanostructured materials are promising for applications in optoelectronic devices. Beyond size-tuning as in quantum dots, shape-tuning of the material at the nanometer scale also results in novel optical and electronic properties. For instance, the multiple exciton generation (which is critical for high-efficient photovoltaic devices) is significantly enhanced in one-dimensional PbSe nanorods as contrast to the zero-dimensional quantum dots. The applications demand high quality and structure-well-controlled materials, which are still greatly underdeveloped. We report a method of catalyst-free, one-pot synthesis of colloidal PbSe nanorods with a well-controlled structure. This method is based on a typical synthesis of PbSe quantum-dot, but a chloroalkane cosolvent is added during the synthesis to drive the one-dimensional growth of the crystal. The synthesized nanorods have a uniform diameter of 6 nm and a length of 40 to 50 nm. Photoluminescence from these nanorods shows a peak at around 2000 nm, exhibiting a strong quantum confinement on the excitons in the nanorods.

> Shreedhar Kandel BGSU

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