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Optical and Magnetic Properties of Single- and Multi-layer, Colloidal Ag_2S Nanoplatelets JOSEPH R. MURPHY, SUBASH KATTEL, Department of Physics, LENORE KUBIE, BRUCE PARKINSON, Department of Chemistry, WILLIAM D. RICE, Department of Physics, University of Wyoming — We report the synthesis, characterization, and magneto-optical behavior of ultrathin, nontoxic, silver sulfide (Ag_2S) nanoplatelets (NPLs) synthesized via a one-pot method. These colloidally synthesized nanoplatelets are the thinnest ever reported, with a thickness of only 3.5 ± 0.2 Å, which is an order of magnitude smaller than the excitonic Bohr diameter of Ag_2S (44 Å). The extent of nanoplatelet confinement is controlled by synthesis conditions and quantized, which is evident in both absorption and photoluminescence (PL) spectroscopy. We measure the excitonic PL quantum yield of these NPLs to be approximately 30%, suggesting their potential use in biomedical imaging. To investigate magnetic properties, we used magnetic circularly polarized photoluminescence (MCPL) and magnetic circular dichroism (MCD) techniques as a function of both temperature ($1.5\text{K} - 300\text{K}$) and magnetic field ($\pm 7\text{T}$). These measurements of single- and multi-layer Ag_2S platelets were used to extract their temperature-dependent excitonic g-factors and probe the electronic structure. The implications of extremely high excitonic quantum confinement on the magnetic properties of the excitons will also be presented.

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