Spin active excitonic states in Mn doped CdSe Nanolayers

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Abstract

Insertion of spin degrees of freedom in the semiconductor by doping of transition metal, activates a long range magnetic ordering suitable for spin-photonics and carrier-induced magnetism applications. The spin dominated optical properties in manganese doped cadmium selenide ultra-thin (thickness ~1.5 nm) layered nanosheets are demonstrated. Our studies reveal the presence of magnetic ordering up to 48 K and co-existence of the multivalency Mn based local structures corroborated to the x-ray absorption near-edge structure and Raman scattering measurements. The room temperature based optical absorption and photoluminescence (PL) measurements affirm the emissions corresponding the band edge and dopant level mediated transitions. The circularly polarized magneto-PL studies at cryogenic temperatures demonstrate the spin allowed radiative transitions confirming the presence of spin-active excitonic states leads to white light emission.

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