Electronic Supplementary Material (ESI) for Materials Advances.
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Effect of quantum confinement on polarization anisotropy emission in Sn-doped CdS microcone

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For the growth of Sn doped CdS micro cone, the growth process can be described as follows: First, SnO_2 precursor reacts with H_2 carrier gas at 200 ℃ to generate Sn(0) steam, which can be transported to the low temperature area. It is deposited on the quartz sheet in the form of liquid ball (Fig. S1a) and grow into a nanowire or nanocone, which provides the surface location for the growth of CdS microstructure on this Sn nanowire or nanocone. during the heating process, slowly reduce the air flow velocity, the Sn micro-or nanocone structure is favored to form due to the non-uniformity of the gas flow in the quartz tube (Fig. S1b). With the increasing temperature, the precursor may be reduced to Sn, Cd, H_2S and H_2O at higher temperature. Possible reaction in tubular furnace: $CdS+H_2 \leftrightarrow Cd+H_2S$. A large amount of Cd and sublimated CdS arrive at the low temperature zone and are deposited on the Sn micro cone to form a CdS shell, which is wrapped on the surface of the Sn micro cone (Fig. S1c). As the liquid instability at high temperatures, most of the Sn nanowires may be liquefied (Fig. S1d) and ejected from the cadmium sulfide wire to form a Sn doped CdS micro cone (Fig. S1e)

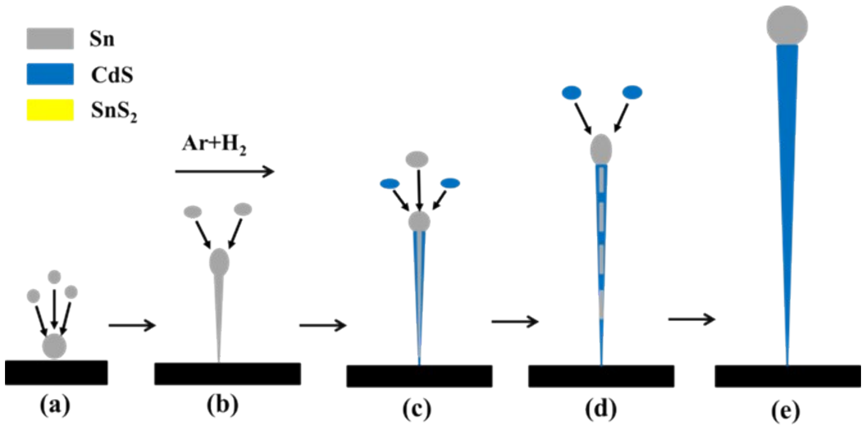

Figure S1. Schematic illustrating the growth process of the Sn-doped CdS microcones

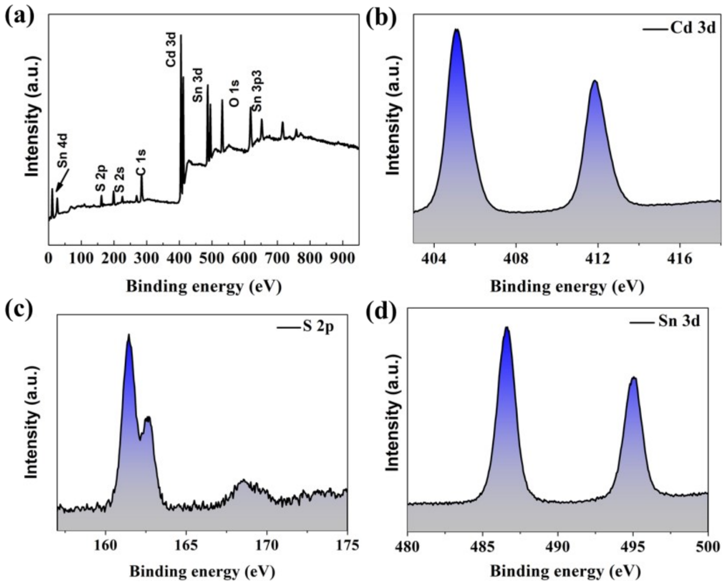

Figure S2. (a) XPS spectrum of Sn-doped CdS microcone. (b) Narrow scan XPS spectrum of Cd 3d energy level. (c) Narrow scan XPS spectrum of S 2p energy level. (d) Narrow scan XPS spectrum of Sn 3d energy level.

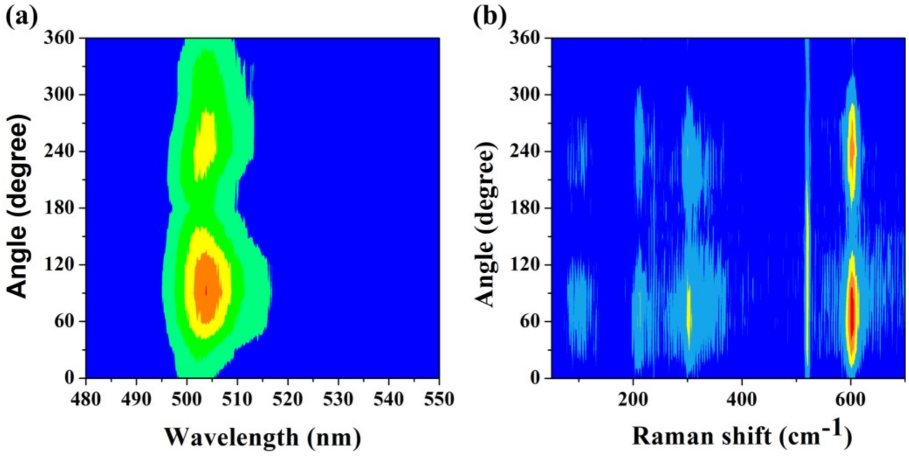

Figure S3. (a)Polarization dependent mapping image of the PL spectra of the Sn-doped CdS microcone excited by a continues 405 nm laser. (c) Polarization dependent mapping image of Raman spectra of the Sn-doped CdS microcone excited by a continues 532 nm laser.