Quantum dot/organic polymer hybrid thin film using silver bismuth sulfide colloidal quantum dots

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Silver bismuth sulfide ($AgBiS_2$) colloidal quantum dots (CQDs) with suitable bandgap for light harvesting have emerged as promising materials for solution processed- optoelectronic devices in these days. As prime candidates for lead free- CQDs based solar cell, many researches are focusing on this treasure hunt, aspect to inherent material character and device architecture design.

The quantum dot/organic hybrid structures have been considered as efficient way to facilitate both charge extraction and transport in solar cell. Also, hybrid CQD/polymer matrix based photodetectors provide percolation network thanks to the interaction between the surface defects of QDs and polymer molecules, which leads to marked improvement in the performance.

Herein, we introduced $AgBiS_2$ CQDs/polymer bulk heterostructures (QPB) films by analyzing electrical and optical properties. The QPB films are showing remarkable carrier extraction confirmed by dark current I-V, impedance studies. We further explored its potential by replacing the long-chain ligands with shorter ligands in QPB solid films. Our study will widen range of interest for various optoelectronics using inorganic/organic hybrid structure.