Lead Chalcogenide Quantum Dots Solar Cells: Toward Efficient Charge Collection

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Band gap tunability and multiple exciton generation(MEG) of quantum dots make them promising material for various electronic applications. MEG, more than 1 exciton generation per 1 photon, is more efficient in quantum dots than the bulk due to discrete energy levels of quantum dots[1]. By achieving MEG in solar cells, we can obtain high performance solar cells exceeding Shockley-Queisser limit[2]. Lead chalcogenide quantum dot is one of the most promising quantum dot to achieve MEG due to its large exciton Bohr radius, which leads to highly confined energy structures[3].

In this study, we fabricate lead chalcogenide quantum dot depleted heterojunction solar cells. By the surface treatment of quantum dots with 1,2-ethandithiol(EDT) and hydrazine, we can enhance charge transfer and collection. Finally, we achieved high photocurrent level nearly 20 mA/cm^2 with the lead chalcogednide quantum dots having band gap of 0.8 eV

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