

2D PbS Nanosheets Synthesis and Their Applications as Field Effect Transistors or Solar Cells

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Abstract : Two-dimensional, solution-processable semiconductor materials are interesting for low-cost electronic applications [1]. We demonstrate the synthesis of lead sulfide nanosheets and how their size, shape and height can be tuned by varying concentrations of pre-cursors, ligands and by varying the reaction temperature. Especially, the charge carrier confinement in the nanosheets' height adjustable from 2 to 20 nm has a decisive impact on their electronic properties. This is demonstrated by their use as conduction channel in a field effect transistor [2]. Recently we also showed that especially thin nanosheets show a high carrier multiplication (CM) efficiency [3] which could make them, through the confinement induced band gap and high photoconductivity, very attractive for application in photovoltaic devices. We are already able to manufacture photovoltaic devices out of single nanosheets which show promising results.

Keywords : physical sciences, chemistry, materials, chemistry, colloids, physics, condensed-matter physics, semiconductors, two-dimensional materials

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