From bulk crystals to nanowires: investigating $CH_3NH_3PbI_3$ photovoltaic perovskite

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Recently, it has been shown by the Snaith [1] and Graetzel [2] groups that $CH_3NH_3PbI_3$ is very promising material in photovoltaic devices reaching light conversion efficiency (η) up to 21%. A strong research activity has been focused on the chemistry of the material to establish the most important parameters which could further improve η and to collect photons from a broad energy window. The major trend in this field is in photovoltaic device engineering although the fundamental aspects of the material are not yet understood.

In my lab we have devoted considerable effort to the growth of high quality single crystals at different length scales, ranging from large bulk crystals (up to 100 mm^3) through nanowires [3,4] down to quantum dots of tens of nanometers of linear dimensions. The structural tunability of the material allows to study a broad range of physical phenomena including electrical and thermal transport, magnetism and optical properties which will be reported in this presentation together with some device applications [5].

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