Organo-metallic hybrid halide perovskite: beyond photovoltaics

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Recently, it has been shown that CH3NH3PbI3 is a very promising material in photovoltaic devices reaching light conversion efficiency ($\eta$) up to 23%. A strong research activity has been focused on the chemistry of the material in order to establish the most important parameters which could further improve $\eta$ 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 fully understood.

In my laboratory, we have devoted considerable efforts to the growth of high-quality single crystals at different length scales, ranging from large bulk crystals (up to 10 cm$^3$) through nanowires down to quantum dots of tens of nanometers of linear dimensions. The structural tunability of the material allows the study of a broad range of physical phenomena including electrical and thermal transport, magnetism, optical properties, band structure by photoemission etc. In this presentation, a selected set of measurements will be reported together with some device applications.

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