

"Hybrid Materials for Efficient Energy Generation and Information Technologies"

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Title: Next generation hybrid solar cells combining innovative nanostructures, polymers, perovskites, and graphene

The aim of the PhD thesis is focused on the preparation and investigation of a new type of hybrid solar cell. This cell contains nanostructures covered by small organic molecules, perovskites or thin polymer films contacted by undoped or doped large area graphene layers. The nanostructures, which will lead to an efficient light trapping behaviour, will be formed by oxide or polymer templates covered by thin film Si and by metal induced etching of crystalline Si wafers or poly Si thin films. Due to the high surface area interface/surface passivation is of major importance and will be implemented by small organic molecules via chemical or electrochemical grafting.

The influence of interfaces in the solar cells will be investigated by photoelectron and photoluminescence spectroscopies, and time resolved photoluminescence and surface photovoltage experiments while interaction with the graphene layers will be measured by Raman and other vibrational spectroscopies.