DIPARTIMENTO DI MATEMATICA E FISICA "NICCOLÒ TARTAGLIA"

Structure-function relationship in photovoltaics

Introduce:
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Abstract
The extension and further development of photovoltaics is essential to reduce the carbon footprint of industrialized nations by 2050. This implies that all forms of harvesting solar energy must be exploited. Since there is no clear front-runner in low-cost alternative photovoltaic devices, it is important to pursue all possible avenues. Organic solar cells have many advantages and therefore have the potential to supplement energy production of silicon based solar cells.

Our research focuses on two promising polymer-based OPV technologies with the goal of unravelling the way in which structure formation during processing affects device performance in (i) all organic systems, encompassing conjugated polymer blended with C60 derivatives and polymer-polymer blends, this is then extended to (ii) the more recent hybrid polymer - nanocrystal quantum dot (NCQD) devices. The final aim is to gain a fundamental understanding of the formation of mesoscopic morphologies within the photoactive layers, as well as their formation kinetics.

Our study resulted in a fundamental understanding of structural and functional properties of semiconducting polymers, blended with different classes of fullerenes, conductive polymers and NCQDs. In particular, the application of NCQDs in combination with polymers has proven to be extraordinarily effective. Further advances in overall efficiency are expected by extending the electronic functionalities through the fundamental understanding of the structural properties of NCQDs and broadening this concept to the organic semiconductors, with a high impact within the energy field and relevant technological implications.

Seminario

Martedì 18 ottobre 2016
Sala Riunioni, ore 11.30
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