

## **Solution Processed Semiconductor Composites for Photovoltaic Applications: On the Correlations between Microstructure, Performance and Lifetime**

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Solution processed semiconductors play an essential role in the future renewable energy scenarios where power generation by photovoltaics will be one of the pillars for the world's clean energy supply. The printed organic photovoltaics technology has evolved from the 1 % regime in the 90s to the 10 % regime nowadays. Perovskite semiconductors have lead the efficiency pathway of printed semiconductors beyond the 20 % regime. However, especially the most recent generations of high performance materials show a number of unforeseen microstructure related degradation mechanisms, which are closely related to their performance.

This presentation will outline fundamental microstructure mechanisms impacting performance and lifetime. Several molecular mechanisms are discussed in more detail, among them the dimerization of fullerenes. A set of structure – property relations are introduced with the goal to better keep the balance between stable and efficient microstructures.