

DSSC of p-type: status, development and perspectives

Daniilo DINI – *Sapienza University of Rome*

The dye-sensitization of wide bandgap semiconductors (SCs) having energy bandgap larger than > 3 eV (or, equivalently, absorption wavelengths lower than 420 nm), for the production of photocurrents at luminous energies lower than the characteristic one of the unsensitized SC has been demonstrated for the first time by Gerischer in 1968 for both n- and p-type SCs when combined with sensitizers having frontier levels matching with the band edges of the SC. Successively in 1991 the invention of Gratzel's cell, the dye-sensitized solar cell (DSSC), has opened a new applicative research line in the ambit of hybrid photovoltaics which has led to the development of low cost DSSCs reaching conversion efficiency as high as 15 % thanks to the utilization of SCs with nanostructured morphology, a feature that allows charge photoinjection on large surface areas. The present contribution is focussed on the development of p-type DSSCs (p-DSSCs) following the progress on photocathodic materials and on the design/synthesis of the relative dye-sensitizers. The interest in p-DSSCs mainly arises for their employment in tandem, half-transparent photoelectrochemical cells for the finality of building-integrated photovoltaics (BIPV). Moreover, the application of the principle of p-type SCs sensitization is discussed for the realization of photoactivated CO₂ electroreduction.