Novel Concepts in Solid-state dye-sensitized solar cells

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We present two major concepts to improve the performance of solid-state dye-sensitized solar cells (SDSC). In concept I, we design and synthesize novel heteroleptic Ru(II)bis(bipyridyl)(NCS)2 dyes carrying a variety of donor-antenna groups. These dyes typically comprise of an efficient anchoring group to guarantee a proper connection between the dye and the mesoporous TiO2 surface, two NCS-groups to cause a bathochromic shift of the absorption spectra and novel donor-antenna groups. These groups effect very high extinction coefficients and as a consequence of this a distinctive light harvesting behaviour. To prove the performance of this new dyes they were applied in SDSCs consisting of FTO coated glass, mesoporous TiO2 and for regeneration of the dyes Spiro-OMeTAD as hole transport layer. In concept II, we developed novel porous TiO2 network using spherical polymer electrolyte brushes (SPB) as templates to control the morphology of the network and thus to provide best conditions for a sufficient pore filling and an effective electron transport. The facile tuning of the brush length as well as core size of the precursor and defined amounts of TiO_2 hydrolysed within the brushes finally provide exact control on the resulting morphology of the porous network.

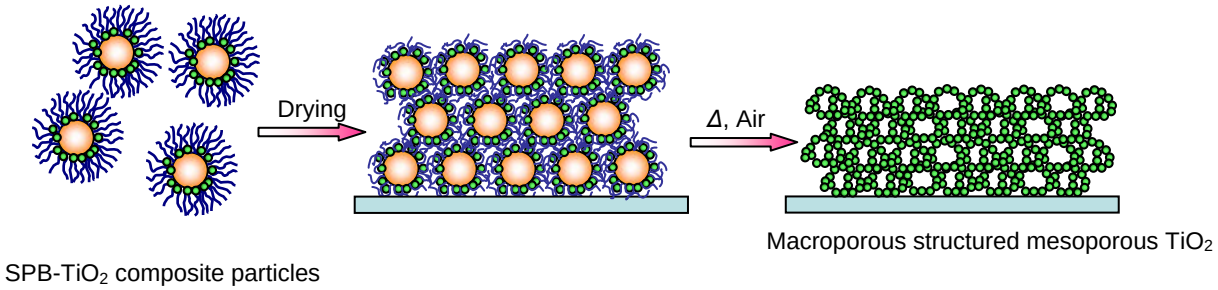

Figure 1: *Schematic representation of a novel method for the preparation of mesoporous network of TiO_2 with controlled pore sizes using spherical polymer brush (SPB) template*

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