Fabrication and characterization of high-performance platinum interdigitated electrodes using nanoimprint lithography

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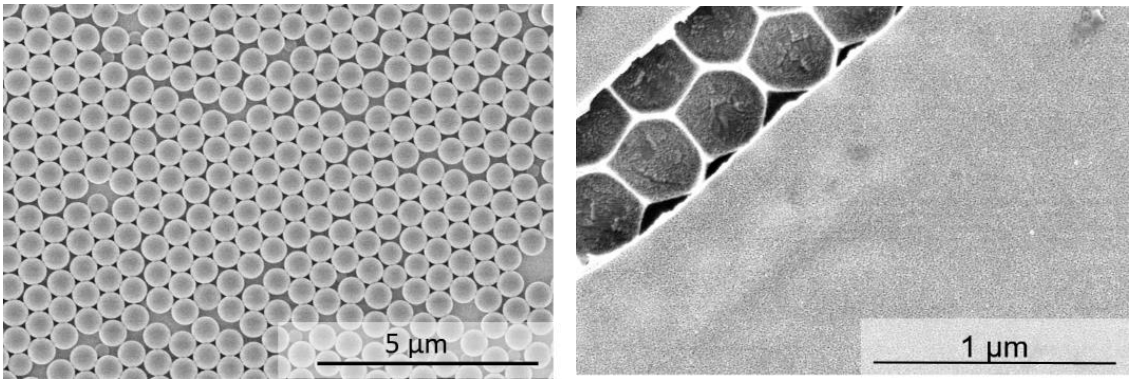
In the electronics sector, especially in disyplay technologies, the demand for functional materials Indium Tin Oxide (ITO) is the most commonly used n-type semiconducting oxide. With high transparency (>85 %) in the visible range, a wide band gap, low specific resistance (10^{-5} Ω/cm), chemical stability and good adhesion properties on different substrates, it is suitable as electrode for optical and electronic devices[1,2].

Especially for optoelectronic devices ITO is a commercially used transparent anode material. Several authors discuss positive effects of random and ordered structures out-coupling layers on organic light emitting diodes.[3] Transparent structured metal oxides offer thus the opportunity of creating photonic band gaps and manipulating the light passage through the material, as investigated intensively in the last years.[4]

Here we describe a simple three-step fabrication of optical transparent, conducting ITO thin films with an inverse opal structure inside. The preparation is based on colloidal crystal templating with polystyrene microspheres. To access different periods of this structure, different sphere sizes were assembled to monolayers on a substrate by spin coating and infiltrated afterwards. The thin films show excellent anti-reflexion behavior, good transmission as well as a good resistance of 200 Ω/sq. The properties are promising for several optoelectronic applications such as in- or out coupling structures in solar cells and organic light emitting diodes.



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