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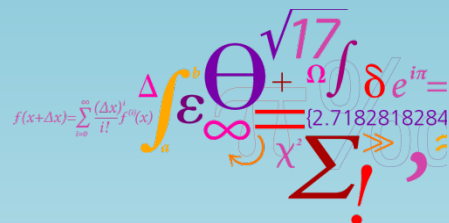
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Dye-sensitized solar cell derived from nano-porous polymer Tao Li (PhD student, Self-organized Nanoporous Materials), Sokol Ndoni



OBJECTIVES

Fabrication of an interconnected, crack-free and highly ordered titania film for high performance dye-sensitized solar cell (DSSC) by using nano-porous polymer of controlled morphology as the template.



ABSTRACT

- Nano-porous cross-linked polybutadiene has been used as the template which has good wetting properties with various inorganic precursors.
- A novel and facile nanocasting process has been developed to fabricate a thin film with 10-nm wide titania network which is compact, interconnected, and continuous.
- The same method applied in making mesoporous tin dioxide and carbon is progress.



BACKGROUND

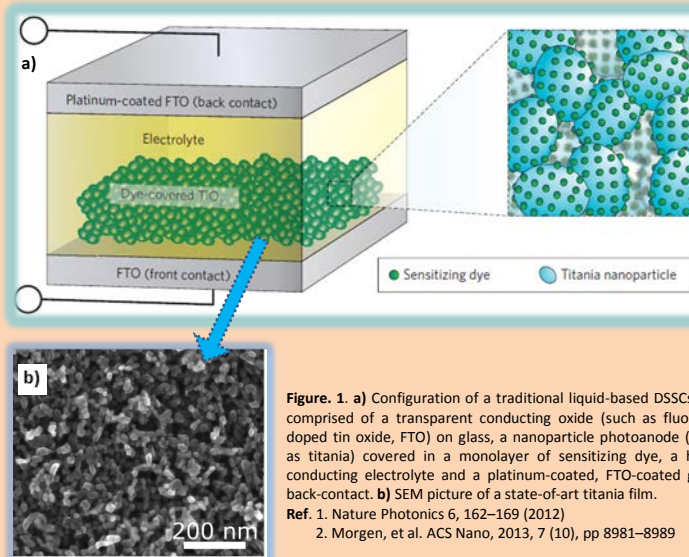


Figure 1. a) Configuration of a traditional liquid-based DSSCs are comprised of a transparent conducting oxide (such as fluorine-doped tin oxide, FTO) on glass, a nanoparticle photoanode (such as titania) covered in a monolayer of sensitizing dye, a hole-conducting electrolyte and a platinum-coated, FTO-coated glass back-contact. b) SEM picture of a state-of-art titania film.
Ref. 1. Nature Photonics 6, 162–169 (2012)
2. Morgen, et al. ACS Nano, 2013, 7 (10), pp 8981–8989



STRATEGY & RESULTS

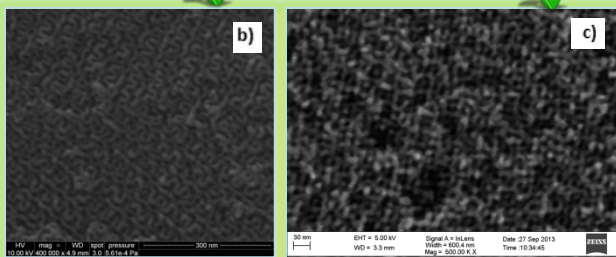
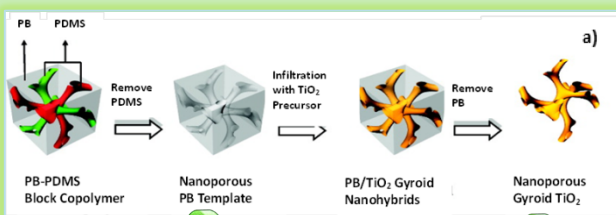


Figure 2. a) Nanocasting process to fabricate 3D nanostructure of inorganic materials. b) SEM picture of the nano-porous polybutadiene template. c) SEM picture of the as-made titania network with a crystal phase of anatase.

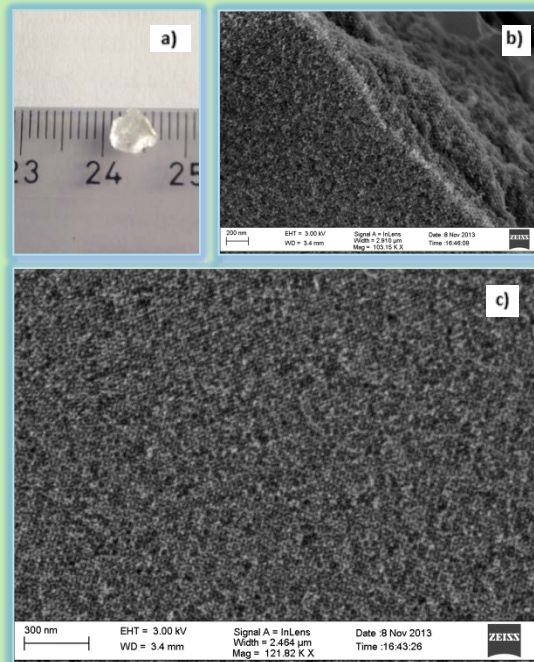


Figure 3. a) As-made titania thin film b) SEM picture of the tin dioxide on the edge of the film. c) SEM picture of the titania network showing long range order.