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The role of seeding in the morphology and wettability of ZnO nanorods films on different substrates (Article)

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Abstract

Spray pyrolysis (SP) and spray-gel (SG) techniques were used to deposit ZnO seeds on Fluor doped tin oxide glasses (FTO), heated at 350 C or 130 C, and PET heated at 90 C. The effect of seeding on the morphology and wettability of ZnO nanorods (NRs) films grown by wet chemical methods was analyzed. The morphology and wettability of ZnO NRs films depend on the seeding process. SP seeds formed from zinc acetate dissolved in water ethanol mixtures yield vertically aligned ZnO NRs, whose diameters and dispersion size are determined by the ethanol/water ratio in the precursor solution. SG seeds formed from a methanol ZnO sol produce a ring patterned distribution on the FTO substrate. The drying of ZnO sol drops impinging on the substrate produces high density of seeds along a ring yielding textured films with NRs vertically oriented on the rings and multi-oriented outside them. This effect was not observed when ZnO NRs grown onto the ZnO/PET substrate, however rod diameter is related with the density of seeds. This way to control the density and diameter of NRs deposited onto a substrate modify the wettability and opens new possibilities for the design of tailored nanomaterials for photochemical applications. Both type of NRs films showed a strong luminescence emission in the UV and in the blue, associated with surface and intrinsic defects. © 2013 Published by Elsevier B.V.

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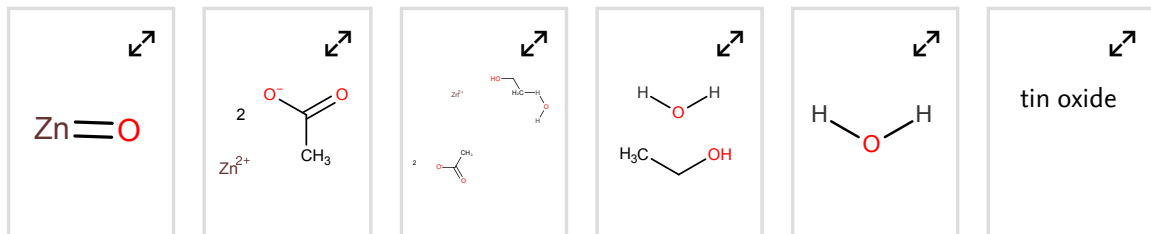
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