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Plasma assisted glacing angle deposition of transparent and conductive ITO thin films

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Glancing angle deposited (GLAD) oxide thin films are quite interesting materials due to the wide variety of nanostructures that can be obtained with this method. Most important properties of the oxide GLAD thin films rely in the possibility to tailor their nanostructure in the form of tilted columns and other more complex forms. This nanostructure is caused by geometrical shadowing effects during the thin film growth. Porous GLAD films have been used as hosts or templates to fabricate new nanocomposite materials and other complex optical nanostructures like photonic crystals, dye sensitized solar cells, optical sensors and microfluidic devices. [1-3]
In this work we study the fabrication of transparent and conducting Indium tin oxide films (ITO) by a novel synthetic approach consisting in GLAD deposition assisted by a microwave ECR plasma. The ECR microwave discharges are fully compatible with the range of pressures required for the electron evaporation process utilized for the deposition of the ITO thin films. The objective of the plasma is to modify the growth mechanism of the GLAD process in order to control the columnar microstructure, porosity and the properties of the films. Thin films and multilayers synthesized in different plasma conditions and also in the presence of alternating plasma discharges will be studied. An additional advantage of the use of a plasma assisted process is the direct synthesis of transparent and conductive thin films at near room temperature that not require post-deposition annealing treatments.
[1] M. J. Brett et al. Science, 319 (2008) 1192. [2] L. González-García et al., Energy and Environ. Sci., 4, (2011), 3426. [3] V. Rico et al. J. Phys. Chem. 113 (2009) 3775.

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