

### Textured ZnO Transparent Conducting films for Silicon thin film solar cells

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Generally ITO(Indium Tin Oxide) is used for transparent conductive film in Solar cells. But as we know ITO is made by vacuum process and Indium source is very expensive. So recently many research groups studying about different types of TCOs instead of ITO. ZnO is one of the best choice because of low process temperature and low cost. We studied for ZnO by ultrasonic spray method. Advantages of ultrasonic spray method have non-vacuum system and possible the large area. For reduce of reflectance, changed the surface morphology of AZO substrate. Especially the unique surface textures of ZnO films grown by chemical bath deposition were presented. Both the zinc concentration and ethanol content in the chemical bath were found to affect the surface texture of ZnO films significantly. At certain growth conditions, the commonly observed textures derived from ZnO hexagonal rods evolve into unique shell-like textures. The shell-like surface textures are entirely different from the common textures in that the shape of grains is not hexagonal but rather round. A possible mechanism for the shell-like texture growth was discussed. And finally we shown the characteristics of Silicon thin film solar cells based on the ZnO TCO.