Comparison of APCVD to LPCVD Processes in the Manufacture of ZnO TCO for Solar Applications

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Author(s):
Wei Zhang, T. Salagaj, C. Jensen, K. Strobl
CVD Equipment Corporation, 1860 Smithtown Ave., Ronkonkoma, NY 11779

A 3" horizontal tube furnace, First Nano EasyTube 3000 system, was used to investigate the optimization of both APCVD (Atmospheric Pressure Chemical Vapor Deposition) and LPCVD (Low Pressure Chemical Vapor Deposition) processes to grow both boron and fluorine doped ZnO films with a resistivity, sheet resistance and haze suitable for their potential utilizations as TCO (Transparent Conductive Oxide) layers for photovoltaic applications. Growth rates as high as 100 nm/min have been obtained in some parameter regions for both processes. In both cases the resulting material property parameters were the same or better than reported in the literature. Although the horizontal hot wall CVD R&D reactor is not optimum for uniform TCO thin film deposition it allowed us to investigate the interrelationship of the most critical parameters with the resulting material properties.

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