

IT-004

<Invited Speaker>

Expanding Thermal Plasma CVD of Silicon Thin Films and Nano-Crystals: Fundamental Studies and Applications

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In this presentation I will review the expanding thermal plasma chemical vapour deposition (ETP-CVD) technology, a deposition technology capable of reaching ultrahigh deposition rates. High rate deposition of a-Si:H, μ c-Si:H, a-SiNx:H and silicon nanocrystals will be discussed and their various applications, mainly for photovoltaic applications demonstrated.

An important aspect over the years has been the fundamental investigation of the growth mechanism of these films. The various in situ (plasma) and thin film diagnostics, such as Langmuir probes, retarding field analyzer, (appearance potential) mass spectrometry and cavity ring absorption spectroscopy, spectroscopic ellipsometry to name a few, which were successfully applied to measure radical and ion density, their temperature and kinetic energy and their reactivity with the growth surface. The insights gained in the growth mechanism provided routes to novel applications of the ETP-CVD technology, such as the ultrahigh high growth rate of silicon nanocrystals and surface passivation of c-Si surfaces.