

Atomic layer deposition and applications for displays

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Atomic layer deposition (ALD) has sparked a lot of interest in semiconductor device fabrications for a number of reasons. The process is intrinsically atomic in nature and results in the controlled deposition of films in sub-monolayer units with superior uniformity over wide area. Ideally, film thickness is determined by number of deposition cycles, rather than timing of a continuous deposition process (like PVD) with a precalibrated deposition rate. For this reason, the ALD process is often described as a 'digital' deposition technique, as opposed to the prior 'analog' techniques. These days, the ALD is quickly becoming a technology of choice for a wide range of applications including nanotechnology, advanced memory devices, MEMS, and solar cell. The characteristics of ALD such as superior large area uniformity and low process temperature are especially beneficial for display device fabrication. In fact, the invention of ALD was motivated by the need of deposition technique to produce uniform thin films over wide area for phosphor and dielectric layers of electroluminescence display devices. In this presentation, the principles and the current status of ALD applications in semiconductor device industry will be presented. Also the overview of ALD applications in various areas and possible research opportunities in advanced display device fabrications will be presented.