

Atomic Layer Deposition for Interface Engineering of Energy Conversion Devices

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Thin film solid oxide fuel cells (SOFCs) which employ thin film solid oxide electrolytes have recently been actively studied to reduce the ohmic loss stemming from the ionic transport inside the electrolyte. In the thin film SOFCs, the activation loss at the cathode becomes a major loss due to the sluggish oxygen reduction reaction (ORR) at low temperature. Regarding that the cathodic activation process mainly occurs in two individual steps at two different interfaces, namely, 1) oxygen reduction at the electrode-gas interface and 2) oxygen ion incorporation at the electrode-electrolyte interface, it is extremely important to engineer the interfaces for higher performance LT-SOFCs. In this talk, the engineering techniques to improve the activation process at the cathode of LT-SOFCs with atomic layer deposited (ALD) nanostructures are presented. ALD can modify and improve the two relevant interfaces in the cathodic activation process, i.e., electrode-gas and electrode-electrolyte interfaces. LT-SOFCs with engineered interfaces have shown improved power density as well as more thermally stable operation.