

Atomic Layer Deposition (ALD), enhanced thin films

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Atomic Layer Deposition (ALD) is a thin film deposition method with many unique features. ALD is done in gas phase and it is based on alternate saturating surface reactions. ALD is chemical vapor deposition (CVD) like coating method, but as distinct from CVD, in ALD process the precursor vapors are pulsed alternately into the reaction chamber. Precursors are pulsed one at a time and separated by purging periods. Each pulsing step saturates the surface with a monolayer of precursor. As result of pulsing there is a unique self-limiting film growth mechanism with a number of advantageous features, such as conformality and uniformity. [1]

ALD films deliver very unique features, such as capability to produce highly conformal pin-hole free films on complex structures and excellent adhesion to most surfaces. ALD's capability to produce these enhanced thin film coatings is often highly appreciated by researchers and industrial applications. Relatively low deposition temperatures and vacuum level in mbar range are also considered positive. The material selection is very wide, including numerous oxide and nitride materials as well as combinations and multi-layer structures of these materials. Examples of these new ALD applications include barrier, anti-corrosion, wear resistant, optical and hard coatings aiming to improve the properties of existing products. ALD has been used for several years in semiconductor and display research and industry, and its industrial application scope is constantly growing.

[1] Ritala M., Leskelä M., Atomic Layer Deposition, Handbook of Thin Film Materials, Vol. 1, Chapter 2., 2001