

Atomic Layer Deposition for Catalysis

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Abstract

Catalysis has been involved in majority of chemical reactions producing our daily goods, industrial chemicals, clean fuels, etc. It has also played a vital role for the elimination of hazardous compounds to maintain a healthy environment. The future development of catalysts, relying on the fundamental reaction mechanisms understanding and rational design towards high activity, stability, and selectivity. ALD becomes a facile method to tune catalyst size, composition, structures, as well as the active site structures and their local chemical environments, to obtain the atomic level understanding of structure-activity relationships, design and synthesis of highly efficient catalysts.

This tutorial consists of three parts. The first part covers metal catalysts synthesized via ALD, for controllable size, composition, and structures of alloy and core-shell nanoparticles. The second part focuses on ALD of metal oxides for developing various composite structures, as well as the detailed synthesis strategies for the composite structures and their catalytic performance relations. Finally, typical ALD reactors for catalysts synthesis will be introduced, and outlook of ALD for catalysis will be discussed.