Se-Hun Kwon et al., Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C4-024

Synthesis and functionalization of nano-catalysts for using a fluidized-bed reactor type powder atomic layer deposition

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Functional nano-catalysts have been received a great attention due to its technological and economical importance in water splitting and purification, fuel cells, energy storages, etc. One of the major challenge in those areas is to find a practical way to lower the use of expensive noble metals, while maintaining or improving its catalytic properties. Among various synthesis techniques, Atomic Layer Deposition (ALD) is recently focused on these areas. ALD has many inherent merits such as an excellent thickness control at the sub-angstrom scale, high conformality even on nano-sized complex structues with high aspect ratios. When ALD process is utilized to deposit metals such as Pt, Ru, Ir, etc, it is possible to produce very small sized nanoparticles during the initial growth stage. Using this initial growth stage of ALD, many researchers have tried to use ALD in the application of catalysts. And, recently developed ALD technique, which is called as powder-ALD, enables this practical application.In this presentation, we introduce our recent research of Fluidized-Bed Reactor (FBR) type powder ALD for Pt based nano-catalyst of polymer electrolyte fuel cells. With an optimized process condition, we showed that lower Pt loaded nano-catalyst, compared with commercial one, can be succesfully prepared and can exhibit an improved catalytic properties due to its higher electrochemical surface area.

Biography

Se-Hun Kwon has received his BS, MS, PhD and Post-doctoral Associate from Department of Materials Science and Engineering from Korea Advanced Institute of Science and Technology (KAIST). His group is focusing on the design and synthesis of functional materials using Atomic Layer Deposition (ALD) techniques and on the fabrication of nanostructures for semiconductors, photovoltaic devices and nanodevices by utilizing a hybrid bottom-up and top-down fabrication approaches.

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