École polytechnique fédérale de Lausanne (EPFL) Valais/Wallis
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EPFL Valais/Wallis SEMINAR

03.06.2020, 10:00-11:00, EPFL Valais/Wallis ZOOM Seminar

Assessment of the ORR Activity and Stability of Nanostructured Platinum Based Electrocatalysts Synthesized by a Novel Top-Down Approach

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The approach to increase the efficiency of the Hydrogen energy utilization will be presented, which is revolved around improving the activity and stability of the catalyst during the reaction. After dividing the hydrogen reaction into ORR (Oxygen Reduction Reaction) and HOR (Hydrogen Oxidation Reaction), the main experiment is focused on the catalyst of ORR because of the bottleneck of sluggish kinetic. Except for the fact that the platinum-based nanoparticle is used, different factors are evaluated, including the particle size, shape and alternative carbon support. On top of that, a novel top-down approach[1] is introduced here to synthesis the nano-particle catalyst to explore the shape effect, which is based on the concave site[2]. Through changing the experiment parameter (amplitude of applied voltage, batch size, concentration of electrolyte) to product nanoparticles in a range of size. The final optimization is trying to product better catalyst comparing with commercial catalyst (TANAKA). The parameter is obtained for further industry production as well.

References:

[1] Yanson, A.I., et al., Cathodic corrosion: a quick, clean, and versatile method for the synthesis of metallic nanoparticles. Angewandte Chemie International Edition, 2011. 50(28): p. 6346-6350.
[2] Calle-Vallejo, F., et al., Why conclusions from platinum model surfaces do not necessarily lead to enhanced nanoparticle catalysts for the oxygen reduction reaction. Chemical science, 2017. 8(3): p. 2283-2289.

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Born in 1994 in Jilin, China, Xiaohan Sun graduated with a B.S. in Physics from the Beijing Normal University in 2016. She went Oct. 2018 to Technical university of Munich for a Master thesis mentored by Prof. Dr. Aliaksandr Bandarenka entitled "Assessment of the ORR activity and stability of Nanostructured Platinum-based electrocatalysts synthesized by a novel top-down approach", and completed with the MSc. degree in Oct. 2019.