

In-situ/Operando Studies of electrocatalysts for water and CO<sub>2</sub> electrolysis

오형석<sup>†</sup>

한국과학기술연구원

(hyung-suk.oh@kist.re.kr<sup>†</sup>)

Nanoscale catalytic materials are key components of various electrochemical devices for storing and converting renewable energy, such as fuel cell, water splitting and CO<sub>2</sub> electrolysis system. Their successful development and optimization require insight into the relations between atomic-scale structure of the catalytic interface and their electronic structure to improve the catalytic activity and stability. In this talk, we will highlight some of our recent work on the design and understanding of precious metal and metal oxide catalyst materials for oxygen evolution reaction (OER) and CO<sub>2</sub> reduction reaction (CO<sub>2</sub>RR). Especially, their electronic structure and electrochemical stability during operating condition were analysed by using in-situ/operando X-ray absorption spectroscopy. In-situ/operando ICP-MS technique was also used to measure the dissolved electrocatalysts and quantify the degree of durability degradation. Based on these results, we will outline the preparation, characterization, and catalytic performance of metal and metal oxide model catalysts and discuss fundamental aspects of their structure-activity and -stability relationships.