Understanding the catalytic property of ceria-based nanoparticles in liquid phase using in situ transmission electron microscopy (TEM)

성종백, 최백규, 김주덕, 김병효, 이동훈, 현택환, 박정원†
서울대학교
(jungwonpark@snu.ac.kr†)

Ceria-based nanoparticles are widely used in catalysis due to its unique redox property. While catalyzing redox reactions, ceria-based nanoparticles are known to interact with its surrounding environment by exchanging lattice oxygen. However, oxygen transport between ceria-based nanoparticles and the environment can be significantly different in the case of liquid phase catalysis such as scavenging reactive oxygen species (ROS). Herein, we introduce in situ liquid cell TEM to understand the oxygen release behavior of ceria-based nanoparticles in different liquid conditions. We elucidate that etching of nanoparticles observed in TEM are governed by the release of lattice oxygen to liquid media. In addition, quantification of the etching rate in facet level reveals the change in relative redox behavior of different surface facets according to the reaction environment.