Conductivity-Dependent Completion of Oxygen Reduction on Oxide Catalysts

이동규, 송현곤[1,†]
UNIST; [1]UNIST 나노바이오화학공학과
(philiphobi@unist.ac.kr[†])

The electric conductivity-dependence of the number of electrons transferred during the oxygen reduction reaction is presented. Intensive properties, such as the number of electrons transferred, are difficult to be considered conductivity-dependent. Four different perovskite oxide catalysts of different conductivities were investigated with varying carbon contents. More conductive environments surrounding active sites, achieved by more conductive catalysts (providing internal electric pathways) or higher carbon content (providing external electric pathways), resulted in higher number of electrons transferred toward more complete 4e reduction of oxygen, and also changed the rate-determining steps from two-step 2e process to a single-step 1e process. Experimental evidence of the conductivity dependency was described by a microscopic ohmic polarization model based on effective potential localized nearby the active sites.