

Highly active Ruddlesden-Popper catalyst with in situ grown Co-Ni alloy nanoparticles for efficient CO<sub>2</sub> electrolysis to CO

박성민, 김윤곤, 한현수, 윤원근, 최준일, 한정현, 김원배<sup>†</sup>

POSTECH

(kimwb@postech.ac.kr<sup>†</sup>)

We report the in situ grown Co-Ni alloy nanoparticles anchored on the Ruddlesden-Popper catalyst and its use as an effective catalyst for high temperature CO<sub>2</sub> electrolysis in a solid oxide electrolysis cell (SOEC). This catalyst is simply obtained by directly reducing a perovskite-derivative of (La,Sr)(Co,Ni,Mn)O<sub>3</sub> and the in situ exsolution of Co-Ni alloy nanoparticles are confirmed by use of XRD, SEM, TEM and EDS. The outstanding current density value of 660 mA/cm<sup>2</sup> was accomplished at 1.3 V and 850 °C with no sign of degradation is indicated as observed by stability test. In situ exsolved Co-Ni alloy nanoparticles and the introduced oxygen vacancies resulted from the phase transition contributed to the enhanced catalytic activity. Therefore, these high current density and stability of catalyst developed in this study could give an opportunity to serve as the promising cathode material for the CO<sub>2</sub> electrolysis reaction.