

## High rate performance of cathode material as sodium-ion battery

최민재, 선양국<sup>1,†</sup>

한양대학교 에너지공학과; <sup>1</sup>한양대학교

(yksun@hanyang.ac.kr<sup>†</sup>)

The development of high-energy and high-power density sodium-ion batteries is a great challenge for modern electrochemistry. The main hurdle to wide acceptance of sodium-ion batteries lies in identifying and developing suitable new electrode materials. We present a composition-graded cathode with average composition Na [Ni<sub>0.61</sub>Co<sub>0.12</sub>Mn<sub>0.27</sub>]O<sub>2</sub>, which exhibits excellent performance and stability. In addition to the concentration gradients of the transition metal ions, the cathode is composed of spoke-like nanorods assembled into a spherical superstructure. Individual nanorod particles also possess strong crystallographic texture with respect to the center of the spherical particle. Micro-compression tests have explicitly verified the mechanical robustness of the composition-graded cathode and single particle electrochemical measurements have demonstrated the electrochemical stability during Na<sup>+</sup> -ion insertion and extraction at high rates.