

## Preparation of CeO<sub>2</sub>-coated Li<sub>1.2</sub>Mn<sub>0.54</sub>Co<sub>0.13</sub>Ni<sub>0.13</sub>O<sub>2</sub> as cathode materials for Lithium Ion Batteries

Jitie Sun<sup>2,a</sup>, Zihao Zheng<sup>2,a</sup>, Wenchao Xia<sup>2</sup>, Lei Zhou<sup>2</sup>, Yanan Wei<sup>1,2</sup>, Fengli Bei<sup>1,2,\*</sup>

<sup>1</sup> National Quality Supervision and Inspection Center for Industrial Explosive Materials, Nanjing University of Science and Technology, Nanjing 210094, P. R. China

<sup>2</sup> School of Chemistry and Chemical Engineering, Nanjing University of Science and Technology, Nanjing 210094, P. R. China

\*E-mail: [beifl@njust.edu.cn](mailto:beifl@njust.edu.cn)

<sup>a</sup> Jitie Sun and Zihao Zheng contributed equally to this work.

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Li-rich cathode material Li<sub>1.2</sub>Mn<sub>0.54</sub>Co<sub>0.13</sub>Ni<sub>0.13</sub>O<sub>2</sub> is an important candidate material for Li-ion batteries. However, due to its low initial coulombic efficiency, poor cycle performance and rate performance, its development has been limited. In order to stabilize the crystal structure and improve the electrochemical performance, CeO<sub>2</sub> was coated on the surface of Li<sub>1.2</sub>Mn<sub>0.54</sub>Co<sub>0.13</sub>Ni<sub>0.13</sub>O<sub>2</sub> by surface engineering strategy while doping trace amount of Ce. The results show that this modification method greatly reduced the Li/Ni mixing level in the material and mitigated the oxygen loss, which was beneficial to improve the electrochemical performance of the material. As expected, the initial cycle coulombic efficiency of the modified sample (4wt % - CeO<sub>2</sub>) increased by 27.5% at 1 C, and the discharge capacity increased by 28.4% after 50 charge-discharge cycles at 0.2 C in the voltage range of 2.0 V to 4.8 V. In particular, the discharge specific capacity increased by 90.4% at a high rate of 10 C. This strongly proves that the strategy has great prospects in improving the electrochemical performance of Li-ion battery electrode materials.

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**Keywords:** Li-rich cathode material; Li/Ni mixed; Oxygen loss; Surface engineering; High rate performance

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