

## Supporting Information

### Electrodeposited conductive polymers PEDOT on the surface of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ electrodes as high-performance lithium-ion batteries

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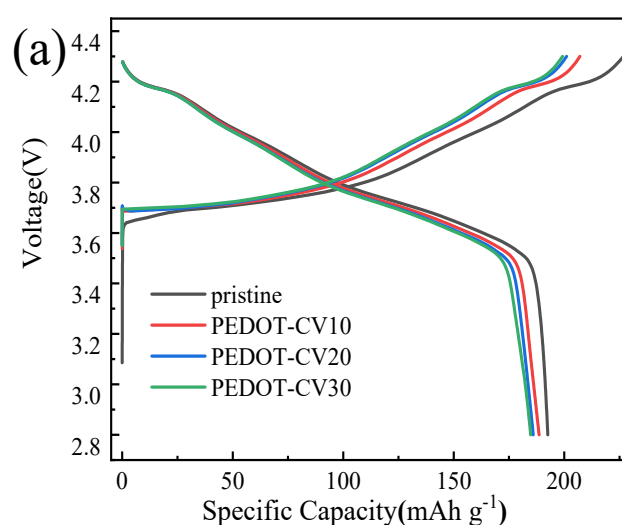


Fig. S1 The first charge-discharge curves of NCM811 materials with different PEDOT coating thicknesses at a rate of 0.1 C

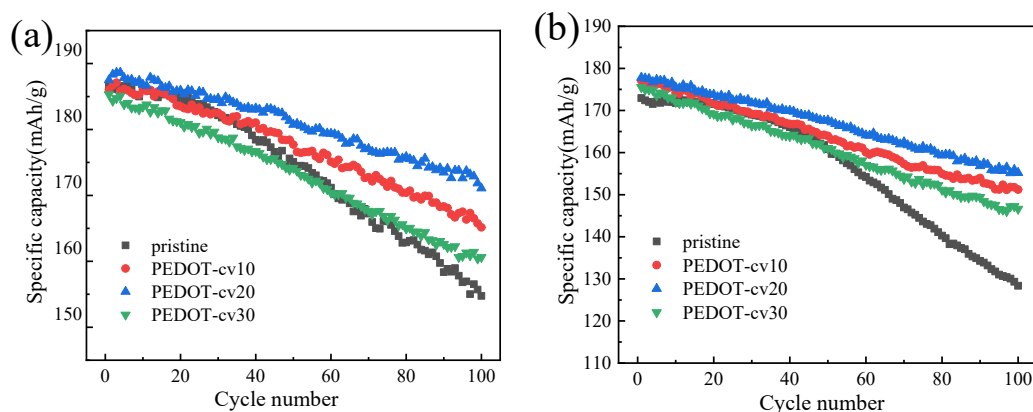


Fig. S2 The cycling curves of materials with different thicknesses of PEDOT coating at 0.2 C (a) and 1 C (b).

Fig. S1 shows the initial charge and discharge curves of NCM811 materials with different PEDOT coating amounts at 25°C and a rate of 0.1 C. The first discharge

capacity of the NCM811 cathode is 192.54 mAh/g, with an initial Coulombic efficiency of 84.64%. The first discharge capacities of PEDOT-CV10, PEDOT-CV20, and PEDOT-CV30 are 188.61, 185.95 and 184.75 mAh·g<sup>-1</sup>, respectively, and their initial Coulombic efficiencies are 91.07%, 92.48% and 92.72%, respectively. Although the initial discharge capacity of the modified NCM811 cathode is slightly lower than that of the original electrode, the electrodes with different PEDOT coating thicknesses exhibit better cycling performance than the original electrode during the electrochemical cycling process. Fig. S2 presents the cycling performance curves of NCM cathodes coated with different thicknesses of PEDOT in the voltage range of 2.8 – 4.3 V at 25°C, under both 0.2 C and 1 C rates. Under a rate of 0.2 C, the original NCM811 cathode shows a capacity decrease from 181.14 mAh·g<sup>-1</sup> to 150.15 mAh·g<sup>-1</sup> after 100 cycles, resulting in a capacity retention of 82.89%. The specific capacities of PEDOT-CV10, PEDOT-CV20, and PEDOT-CV30 are 186.02, 187.50 and 185.32 mAh·g<sup>-1</sup>, respectively. After 100 charge-discharge cycles, their capacities decrease to 165.15, 171.08 and 160.61 mAh·g<sup>-1</sup>, respectively, with capacity retention rates of 88.78%, 91.24%, and 86.67%.