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## New insight into the modification of Li-rich cathode material by stannum treatment

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### Abstract

In this work, Sn is used to dope the Li-rich cathode material to improve the electrochemical performance of Li ion battery. After Sn treatment, the lattice parameters  $a$ ,  $c$  and lattice volume  $V$  become larger. Compared with the pristine sample, the Sn-contained samples show longer plateaux at about 4.5 V in the first charging process, which means that Sn can activate the  $\text{Li}_2\text{MnO}_3$  component. Meanwhile, with appropriate content of Sn doping, the sample exhibits enhanced rate capability and cycling stability. Especially, the sample S10 shows the best electrochemical performance, with a capacity retention of 88.66% after 100 cycles at 1C ( $1\text{C}=250\text{ mA g}^{-1}$ ). The mechanisms of Sn doping have also been investigated. The increased activation of  $\text{Li}_2\text{MnO}_3$  is due to the improved conductivity of  $\text{Li}_2\text{MnO}_3$  phase by Sn doping, and the enhanced electrochemical performance is mainly ascribed to the increased ability of Li ion diffusing into bulk phase and the improved structure stability during the prolonged charge-discharge cycles. It is suggested that Sn doping is an effective way to improve the

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