Functional Nanostructured Oxides for Electrochemical Energy Storage

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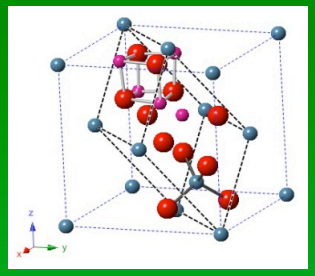
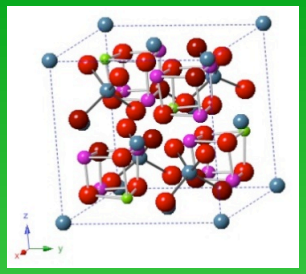
Dependence of the contribution of elementary impedances to total dc polarization on battery discharging time was successfully analyzed with two different structures of $LiNi_{0.5}Mn_{1.5}O_4$ spinel, disordered and ordered structures. Interfacial charge-transfer and solid-state diffusion resistances proved to be the important factors in the course of high-rate battery discharging of spinel materials. Especially, in case of the ordered structure, it was demonstrated that the charge-transfer resistance has the most severe effect on the total dc polarization.

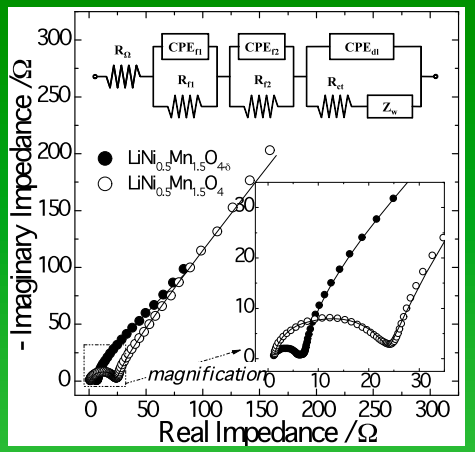
For increasing the reaction sites and reducing the diffusion length, the nanostructured electrodes with nano-wires were prepared, which lowered the dc polarization during battery operation and enhanced battery power. The nanostructured electrodes prepared in this study improved the rate performance, with the relatively lower charge-transfer and solid-state diffusion resistances.



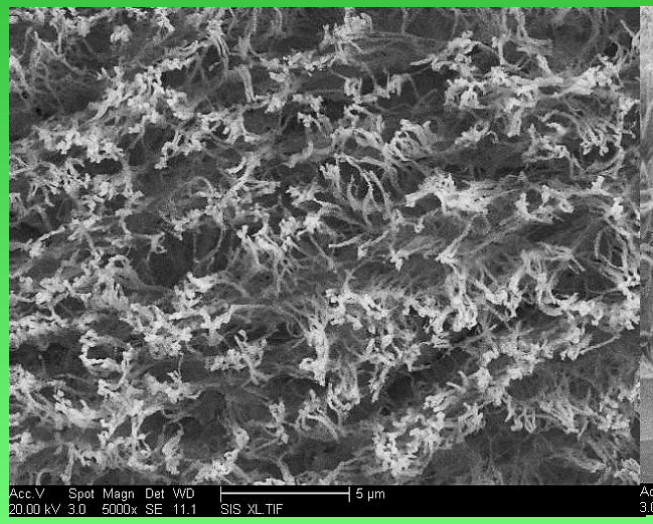
Disordered, F d -3 m

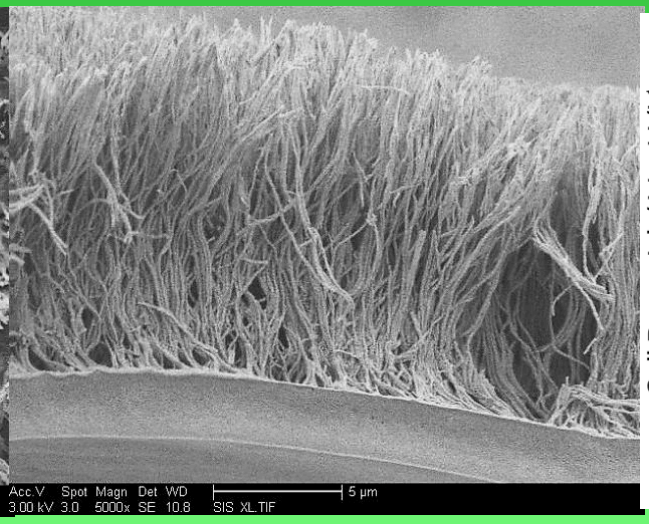


Ordered, P 4_3 3 2



Superior high rate in nano structured electrode





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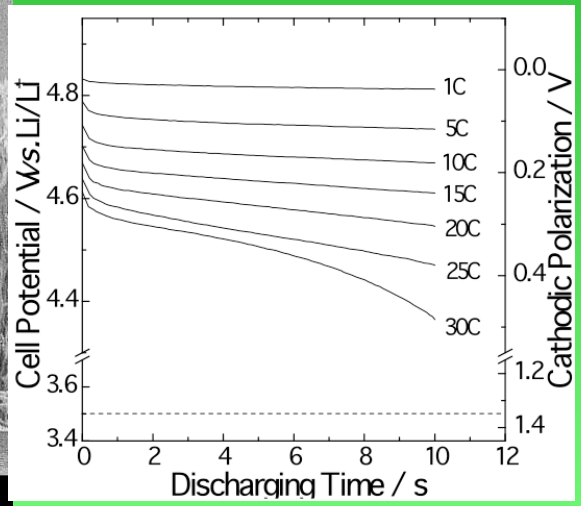

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