Nanostructured LiMn$_2$O$_4$ cathode materials for efficient lithium ion battery energy storage systems

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Nanostructured LiMn$_2$O$_4$ cathode materials have shown significant enhanced electrochemical performance. Lithium ion battery (LIB) has started to penetrate into power sources for electric vehicles and electric energy storage as the need for clean and renewable energy reaches climax. To fully meet the target of using LIBs for electric vehicle suitable electrode materials with high energy and high power density have to be achieved. To date numerous cathode and anode materials have been developed which can deliver high energy and high power density. One of them is high voltage LiMn$_2$O$_4$ which can perfectly suit with this purpose, however it suffers severe capacity fading which hinders it to meet the target. Interestingly, the use of nano-architecturing of electrode materials (both cathode and anode) has shown a very promising result to sustain the capacity of the materials with significantly minimized fading. Bulk LiMn$_2$O$_4$ cathode materials are characterised by capacity fading in maintaining only about 50% of their initial capacity after 100 cycles. By synthesizing nanowire LiMn$_2$O$_4$ their capacity retention increases significantly to about 85% after 100 cycles. In our laboratory we synthesized LiMn$_2$O$_4$ nanorod cathodes from South African manganese precursor source and they retained 95% after 100 cycles. In this talk the advancement of nanostructured cathode and anode materials for LIBs application will be reviewed and our contribution in this regard will also be presented.

Biography
Mesfin Kebede has completed his PhD in 2009 in Materials Science and Engineering from Inha University South Korea and postdoctoral studies from UFS & CSIR in South Africa. He is currently a senior researcher at CSIR. He has been studying and researching nanostructured materials properties and applications as electrodes for lithium ion battery, gas sensor, luminescent and photoluminescence, photocatalysis for almost a decade. He has authored 2 book chapters and more than 35 papers in reputed journals and has been serving as reviewer for several journals and he also serves as editorial board member.