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Electroanalytical methods of energy storage and conversion

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Recent year's energy, water and health care are one of the important areas research carried out by worldwide researchers. Among all energy storage, Lithium Ion Batteries (LIBs) are extensively used in the present-day portable electronic devices and high-power applications like back-up power supplies and electric/hybrid electric vehicles. The commercial LIBs consist of layer-type lithium cobalt oxide, spinel $LiMn_2O_4$ or $LiFePO_4$ as the cathode and graphite or $Li_4Ti_5O_{12}$ as the anode material and a non-aqueous Li- ion conducting solution or immobilized gel-polymer are used as an electrolyte. LIBs need to satisfy several additional criteria, such as safety, toxicity, low cost and long cycle life. To understand reaction mechanisms advanced analytical techniques are needed. In my presentation, I will summarize our group studies on functional materials synthesis by molten salt synthesis, graphenothermal reduction and other facile chemical methods on various oxides, nitride materials and novel metal organic frame work cathode materials will be discussed. The functional materials characterized by various analytical techniques such as Rietveld refinement X-ray diffraction, X-ray absorption fine structure, X-ray photoelectron spectroscopy, SEM, TEM, density and BET surface area methods and cyclic voltammetry, galvanostatic cycling and electrochemical impedance spectroscopy techniques. I will discuss the advantages of morphology, nano/submicron size, matrix elements on capacity values and average charge-discharge voltages and its electrochemical performances and reaction mechanisms.

Biography

M V Reddy has pursued his PhD in Materials Science from ICMCB-CNRS, University of Bordeaux, France. For the last 15 years, he has been working on the materials for Li-ion battery materials (cathodes, anodes, super capacitors and solid electrolytes) including novel methods of synthesis, characterization and has experience in electro analytical techniques. He has published around 167 papers in various international journals. He is serving as an Editorial Advisory Board Member in Materials Research Bulletin and several open access journals. He also won Outstanding Science Mentorship award from Ministry of Education, Singapore and Inspiring Research Mentor award from NUSHS.

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