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Structure, morphology and magneto-transport properties of laser ablated $La_{0.85}Te_{0.15}MnO_3$ thin film on $LaAlO_3$

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The colossal magneto resistance (CMR) effect and associated exotic physical properties exhibited in various electron doped pervoskite manganites have been the subject of extensive research. In this class of manganites, the electron is the majority charge carriers. Such materials exhibit a significant value of CMR that is associated with the mixed-valence state of Mn^{3+}-Mn^{2+}. This property has made them promising as magnetic field sensors, as the elements in magnetic random access memories, for infrared detector applications and as elements in spintronic devices.

We report the structural, morphological and magneto-transport properties of pervoskite oxide La0.85Te0.15MnO_3 thin film grown on (001) $LaAlO_3$ single crystal substrate by pulsed laser deposition. X-ray diffraction (XRD) results confirming that the film has good crystalline quality, single phase, and c-axis orientation. The atomic force microscopic (AFM) results shows that the film consist of grains with a diameter in the range of 20-30 nm, with a root-mean square (rms) roughness of 0.07 nm. The resistivity measurement showed an insulator to metal transition (MIT).Very huge MR (%) of the order of about (93%) close to MIT at 8T of field is noticed. X-ray photoemission spectroscopy confirms the electron doping and suggests that Te ions could be in the Te^{4+} state, while the Mn ions stays in the Mn^{2+} and Mn^{3+} valence state.

Biography

Irshad Bhat is a graduate student having four years of experience in research (Ph.D. program). His main interest covers several problems related to strongly correlated electron systems. The main topic of his research is electron doped manganites that includes metal-insulator transition in oxides and colossal magneto-resistance. His research activities encompass synthesis of materials of different kinds, fabrication of nano composites and physical measurements done down to low temperatures in high magnetic fields using a variety of techniques. His work has been published in several reputed Journals. His current research mainly focuses on thin films of manganites and their characterizations.

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Novel thermo-responsive poly (N-vinyl caprolactam)-g-chitosan sponges as an on-demand drug delivery system for pain management

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The main objective of this work is to develop a thermo-responsive poly (N-Vinyl Caprolactam)-g-chitosan sponge which delivers drug (Etoricoxib, a NSAID) on the local application of heat when patient experiences pain after an orthopaedic post-surgical treatment. PNVCL is synthesized using free radical polymerization of the monomer, N-vinyl caprolactam with lower critical solution temperature (LCST) 33 °C. The phase transition temperature of the polymer has to be increased to around 40 °C for the desired application of controlled drug release on application of heat locally by grafting PNVCL onto Chitosan with EDC-NHS coupling. PNVCL-g-CS sponges are synthesized by crosslinking with glutardehyde followed by neutralizing and washing procedures. The sponges are characterized for SEM to analyse the surface morphology of the sponges, FTIR to confirm the grafting and formation of the crosslinked sponges and DSC to determine its LCST. Porosity, swelling and *in vitro* degradation of the prepared sponges have also been studied. Drug loading and *in vitro* drug release (pH 7.4) at desired temperature (40 °C) with etoricoxib has been measured. Cell viability (MTT assay) has been done for these thermo-responsive sponges with L929 cell lines to prove its biocompatibility *in vitro*. Hence the thermo-responsive PNVCL-g-CS sponges can be a promising on-demand smart drug delivery system for the pain management especially for orthopaedic post-operative application. It can be easily delivered by application of local heat when required by the patient to reduce the pain.

Biography

Indulekha is currently pursuing Ph.D. in Department of Biosciences & Bioengineering, IIT Bombay, India. She completed her Masters (M.Tech) in Nanomedical sciences at Amrita Centre for Nanosciences and Molecular Medicine, Cochin, India. She has a peer reviewed publication titled, "Efficacy of tetracycline encapsulated O-carboxymethyl chitosan nanoparticles against intracellular infections of *Staphylococcus aureus*" in the journal, "*International Journal of Biological Macromolecules*". She has also filed an Indian patent for the above said work (4109/CHE/2011A).

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