Department of Physics (Autonomous)

University of Mumbai

Ph.D Seminar

of

Jitendra K Pendharkar

Department of Physics, University of Mumbai

Supervisor: **Dr Manohar N Nyayate**

Ex-Head and In-Principal

B N Bandodkar College of Science, Thane

Study of Magnetostrictive Properties in Alloys of Ferromagnetic and Rare Earth Metals

Giant Magnetostriction, a Magneto-Mechanical Phenomenon, was observed in the alloys of Iron and Rare Earth Metals like Terbium and Dysprosium even at high Temperatures above 400 K. The present research investigated quaternary alloys of Iron, Terbium, Dysprosium and Gadolinium which attained Giant Magnetostriction at temperatures above 400 K with the additional advantage of very low coercivity. One of the samples showed coercivity one fourth of the best well known sample Terfenol-D and strain produced in thousands. It is also found that Iron is the main element in every such alloy as addition of other elements like Cobalt not only weakens the Magnetization but also lowers Curie temperature. These alloys will be of direct Industrial applications due to their high Magnetostriction, very low Coercivity and very high Curie temperatures.

An electric Induction Furnace capable of melting almost 200 g of metallic alloys under vacuum of 10^{-6} torr has been installed in the BNB research laboratory. The furnace can reach a temperature of 2000 ^{0}C.

Date: Saturday, 15th April 2017

Venue: Seminar Hall, Department of Physics,

Time: 12.00 Noon

Professor & Head
Department of Physics
University of Mumbai

Department of Physics (Autonomous)
University of Mumbai

Ph.D. Seminar

of

Santosh Mani

Supervisor: **Dr. Pradip Sarawade**

Department of Physics, University of Mumbai

Study of Thermo-Mechanical Properties of Liquid Crystal Elastomers

Liquid Crystal Elastomers are novel materials which have attracted significant attraction due to combined properties of orientational order of low molecular weight liquid crystals and elastic mechanical properties of elastomers. These materials have several unusual behaviors like spontaneous; reversible shape change on heating, soft elasticity, mechanical instabilities and optical switching and variety of applications in artificial muscles, shape memory, thermo–mechanical actuation, soft elasticity, motors, contact lenses etc.

In the present study various physical properties of pure, mixed liquid crystals with various concentrations; monomer and nanoparticle dispersed liquid crystals were experimentally studied by PMS/POM, FPSS, DTA and DSC, FTIR spectroscopy, UV-VIS spectroscopy, dielectric studies and R.I. The thermal, optical and mechanical properties of Liquid Crystal Elastomers were also investigated by DMA, XRD and Raman Spectroscopy in addition to above mentioned techniques to understand their response to various external stimuli.

The dispersion of monomer not only increases the inherent strength of the material but also changes phase behavior whereas the sensitivity of pure liquid crystal was enhanced by doping with ferroelectric nanoparticles. The thermal characterizations of LCE shows there is a spontaneous change due to rotation of the liquid crystalline side chains. Our investigation shows positive effect on the modulus which indicates that LCE can act as a long chain hardener in bulk amounts.

Date: Wednesday, 12th April, 2017

Venue: Seminar Hall (PDSR), Department of Physics

Time: 11.00 am

Professor & Head
Department of Physics
University of Mumbai