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A Seminar by NUS Nanoscience & Nanotechnology Initiative

Co-ordination Chemistry for Material Synthesis

Date : 12 June 2008 (Thursday)
Time : 3.00 to 4.00pm
Venue : EA-06-03 Seminar Room, Faculty of Engineering

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Abstract

Co-ordination chemistry is an age old chemistry which was utilized by various branches of science and technology. This chemistry illustrates the interactions between metal ions and anions or molecules of inorganic or organic origin. The co-ordination phenomena generates extra stabilization of metal ions so that it can remain dissolved in solution even in presence of common precipitating agents. We have utilized this concept for making
1) Thin-film in aqueous solution 2) High-tech ceramic oxide 3) Mesoporous materials
4) Nano-sized oxides 5) Metastable oxides
We have introduced first time the co-ordinating agent (it is also called complexing agent) to make thin-film of various chalcogenides thin-films of Bi2S3, Bi2Se3, PbSe,PbS, NiS, NiSe, SnS, SnSe, ZnS, ZnSe, CdS, CdSe, HgSe, CuS, CuSe, CoS, CoSe, Sb2Se3 using complexing agent triethanolamine (N(CH2-CH2-OH)3. The chalcogenide ions were released from thioacetamide , thio-urea and seleno-sulphate. In material chemistry a serious challenge lie with the synthesis of single phasic multicomponent metal oxides. We have synthesized the multicomponent mixed oxides from the mixer of their co-ordination compounds. It has produced homogenous composition and phase formation occurs at relatively lower temperature. With small modification of the process, the sizes of the ultimate powders may reach nano-sizes. This method have been used for making nano-sized powders of spinel, orthoferrite, perovskites, garnets etc. As the co-ordination compounds can retard the rate of formation of precipitation reaction, by controlling the reaction conditions it may generate gel which may culminate into mesoporous materials in presence of templating agents which are mostly surfactant. Thus we have synthesized the mesoporous ZrSiO3, Zr(HPO4)2, Sn(OH)4, Nb2O5, Ta2O5, Zr(MoO4)2, Zr(WO3)2, TiO (HPO4) etc.
The concept is very versatile for synthesis surface functionalized nano-particles particularly for biological applications..

About the Speaker

Prof P.Pramanik did his B.Sc in Calcutta University and received M.Sc , Ph.D from Indian institute of technology (IIT) Kharagpur . He was a rank holder in B,Sc and M.Sc He joined faculty with some special invitation. He is one of the pioneer to initiate research in material chemistry in India. His fields of research were ,thin-film,speciality ceramics, photoconducting polymer , speciality polymer, solgel ,super conductors etc,. Now his group is busy with nano-materials , nano-composites , nano-biotechnology .He has visited abroad several times as visiting scientist and visiting professor . He is the key member of many national committee and international committee . He has received medal from Chemical Research Society of India ,Material Research society of India . He has produced 28Ph.D students , 76 M.Sc students and published about 200 paper in international reputed journals . He has 8 patent rights and sold three to Indian industries . He is consultant of many national industries like BHEL (biggest Govt Company), Tata Pigments, Exide Battery and many others . he is adviser of many national and international universities.

~ All are welcome ~

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