the decay constant. Allowing for factor ~2.5 involved in converting the flux to magnitude scale, the values of α are 2.2 ± 0.1 in R and ~2 in I passbands. This indicates that flux decays in R and I photometric passbands are almost similar. These decay constants indicate that at optical wavelengths afterglow emission from GRB 991208 is decaying much faster in comparison to that from other GRBs observed so far except GRB 990510 where at times later than 1.57 ± 0.03 day after trigger of the burst the value of the decay constant is 2.4 ± 0.02 (Stanek *et al.*, *Astrophys. J.*, 1999, **522**, L39). This is also the brightest afterglow detected at millimeter wavelengths to date. Thus the emission from GRB 991208 afterglow presents an interesting case for understanding the origin of radiation from a γ-ray burst across the entire electromagnetic band.

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Molecular materials are the future*

A winter school in Solid State and Materials Chemistry was organized by the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) to commemorate its eventful existence for ten years.

Materials chemistry encompasses solid state chemistry, carbon science, ceramics, composites and even polymer science in its definition. As the field has evolved, the emphasis has shifted from basic theoretical work to technological applications. With the emergence of new R&D directions, this winter school was intended to acquaint the participants with the latest developments in the area of chemistry and physics of materials. More than 50 delegates from around the country attended the school. There were two participants from abroad, one each from USA and UK. The experts were drawn mostly from the host institute and Indian Institute of Science (IISc), Bangalore. Six outstanding scientists from abroad spoke on the future of their chosen field of study.

Inaugurating the course, C. N. R. Rao (President, JNCASR) said that the school was designed to provide budding researchers an overview of most of the new developments in the area of solid state and materials chemistry and help formulate new directions for research. In his opinion, megastable (molecular) materials will rule the next century because of the increasing demand for their potential applications as advanced performance materials to be used in information processing, communication, armament and transportation. He exhorted the participants to develop new methods for synthesizing and characterizing materials and discover new strategies of tailor-made materials with desired and controllable properties.

The course content of the school consisted of 37 lectures and the session started with a talk by C. N. R. Rao who introduced the subject of materials chemistry and compared it with solid state chemistry. According to him, the most important discoveries in solid state and materials science in the last decade include high temperature cuprate superconductors (1986), supramolecular chemistry (1987), fullerenes and nanotubes (1990), mesoporous solids (1992) and colossal magnetoresistance in manganates (1993). He gave an overview of the recent advancements in the synthetic strategies for developing inorganic materials using transition metal oxides and perovskites. In another lecture he discussed various methods of synthesis and structural elucidation of nanotubes which are long, cylindrical molecules consisting of a circular array of sp^2 hybridized carbon atoms. They are capped at both the ends and can be thought of as elongated fullerenes. Their potential use lies in them being useable as quantum wires in nanoscale electronic devices and catalysis. His third lecture dealt with the charge ordering in rare earth manganates. $Ln_{1-x}A_xMnO_3$ (Ln, rare earth; A, alkaline earth) have created wide interest because they exhibit colossal magnetoresistance (CMR).

C. R. A. Catlow (Royal Institution of Great Britain, London) spoke on atomistic computational and modelling techniques in materials science. In his second lecture, Catlow discussed the molecular diffusion processes in crystalline mesoporous materials using molecular dynamics and flexible framework technique.

That nickel sulphide selenide ($NiS_{2-x}Se_x$) which exhibits electron correlation effects can be used as a paradigm for manipulating electron interactions in solids was demonstrated by the presentation of J. M. Honig (Purdue University, USA). Delivering a separate lecture he reviewed the recent trends in the physics and chemistry of V_2O_3 systems and presented the results of electron correlation effects.

G. Ferey (University of Versailles, France) presented an account of how one could use microporous solids in gas separation, shape selective catalysis, elimination of NO_x and in fundamental research for making the earth more and more green, producing pure water and air. He explained the formation of $M_2(PO_4)_3F_2$ (M, Al, Ga) based on the hexameric unit of oxyfluorinated phosphates. The field of three-dimensional hybrid open-framework inorganic materials has received considerable attention and in his second talk, Ferey gave an overview of the methods employed in their synthesis, structural variations, properties as well as applications of this growing class of materials.

Application of high resolution X-ray diffraction technique in predicting the position of atoms in molecules and molecules in crystals was the subject of a talk by G. U. Kulkarni (JNCASR). In a second talk he described some of the anomalous electronic properties of metal nanocrystals.

*A report on the winter school in Solid State and Materials Chemistry, organized and hosted by the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, during 29 November–4 December 1999.

The chemistry in two dimensions, i.e. intercalation chemistry, which is a possible route to generate new materials with enhanced properties was discussed by S. Vasudevan (IISc). He also gave an account of his success in obtaining layered compounds of metal chalcogenophosphates. Explaining the recent advancements in the area of organic solids, P. Batail (University of Nantes, France) through his two lectures illustrated the many faces of organic–inorganic interface in hybrid materials. The interest in such materials is that with the large number of chemical and structural modifications available, it is possible to design specific properties and produce novel materials with both inorganic and organic characteristics.

While M. S. Hegde (IISc) reviewed the recent progress in the area of solid state chemistry of nitrides, M. A. S. Subramanian (DuPont, USA) presented his data on ferromagnetic copper and manganese oxides with perovskite and pyrochlorate-related structures, aimed at understanding the spin arrangement in perovskite type of magnetic materials. Delivering his second lecture, Subramanian talked about oxyfluorination reactions using inorganic fluorides in solid state. The lecture dealt with the preparation of a novel inorganic compound $Ag_{10}F_8C_2$ which is being used for the production of various alternatives of chlorofluorocarbons at DuPont.

What we can pick out from the nature and apply in our labs was the main point of discussion by R. Seshadri (IISc); he was dealing with the biognostic approaches to inorganic materials inspired by mineralization process in nature. His second talk was related to the potential of electronic structure calculation for predicting electronic properties of inorganic solids.

A. M. Umarji (IISc) reviewed recent trends in the chemistry of low thermal expansion ceramics while A. R. Raju (JNCASR) discussed the formation of thin films of metals and metal oxides using nebulized spray pyrolysis and in a subsequent talk illustrated the floating zone melting crystal growth of novel metal oxides.

S. Ramasesha (IISc) described several models to understand the properties of organic–electronic materials that are likely to become one of the promising materials in the 21st century. In another talk, he discussed the trends in the field of organic materials and discussed electronic and magnetic instabilities in them using solid state theories. S. Balasubramanian (JNCASR) described several methods and problems in the field of molecular dynamics for macromolecules.

While the heteroepitaxy of polar GaAs on non-polar Ge for space photovoltaics was the subject of talk by S. B. Krupanidhi (IISc), P. V. Kamath (Bangalore University) reviewed the progress in the synthesis and characterization of anionic clays and compared its properties with cationic clays.

S. Natarajan (JNCASR) discussed various methods of synthesis and characterization of solid state inorganic materials. He presented an overview of ion-exchange, electrochemical and sol-gel techniques and discussed the strategies used to get materials with desired properties. In his second lecture he explained the chemistry of various inorganic open-framework materials and dealt with the hydrothermal synthesis of open-frame work metal phosphates in the presence of structure directing amines.

What kind of materials can form the glass was the subject matter of the talk by K. J. Rao (IISc). The topic of his second lecture was on chemistry in the kitchen (oven) and he described the principles of microwave technique for the preparation of solids. This provides a novel route for synthesizing materials and is fast, clean and economically viable. Presenting his work in two lectures, J. Spalek (Jagiellonian University, Poland) proposed a simple theory to understand the effect of temperature and disorder on the metal–insulator transition. He also explained the mechanism of triplet pairing in Sr_2RuO_4 using Hund's rule.

While K. S. Narayan (JNCASR) highlighted the novel concepts in the designing of polymer-based photodetectors, V. R. Pedireddi (JNCASR) presented a promising approach for the designing of organic materials using the concepts of supramolecular chemistry. K. B. R. Varma (IISc) discussed the nature of transparent ferroelectric glasses and their potential use as ceramic materials. S. Sastry (JNCASR) illustrated the process of slow dynamics and the glass transition in supercooled liquids.

The meeting emphasized that solid state and materials chemistry is flourishing and will do so for a long time. The future of this borderless discipline of materials science in the 21st century seems to be bright, according to the concluding message given by C. N. R. Rao.

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Incentives to scientists, universities and R&D institutions—Extract from Finance Minister's Budget Speech

The Finance Minister in his Budget Speech for the year 2000–2001 has announced an important measure to encourage our scientists and the various S&T institutions to maximize their patenting efforts. Reproduced below is the relevant extract from the budget speech:

'To fully benefit from the new intellectual property rights regime, we need to encourage our scientists and R&D institutions to maximize their patenting efforts. The Government has decided to allow Universities and Research Institutions to retain the revenue generated from intellectual property rights through publicly funded research and also share a part of the revenue with the inventor.'