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## MEETING REPORTS

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### XII AIRAPT HIGH PRESSURE CONFERENCE

The XII International Conference on High Pressure Science and Technology was held at the University of Paderborn, FRG, from 17 to 21 July 1989 under the auspices of AIRAPT (a French acronym for the International Association for the Advancement of High Pressure Science and Technology). Over 375 papers, about 200 in poster sessions, were presented. The topics covered were high pressure studies in the area of biology, chemistry, solid state physics, polymers, liquid crystals, fluids, and geophysics and planetary physics. Various aspects of high pressure engineering and safety, methodology and techniques for static and dynamic high pressures, and synthesis of superhard materials were also covered. The abstract booklet contains 15 papers from India.

#### *Biological studies*

A number of papers presented dealt with pressure effects on proteins and biomembranes. Model phospholipid biomembranes have been studied under moderately high pressure-high temperature conditions, using high-resolution NMR, infrared spectroscopy and neutron diffraction. According to a number of papers presented at this conference, high pressure studies on these materials have thrown considerable light on various biomedical aspects, such as mechanisms of anaesthesia and alcohol-induced liver cirrhosis, structural and dynamic properties of cancer cells, pressure-temperature phase diagram of phospholipids, etc. Raman spectroscopy of protein samples under pressure has yielded interesting results on conformational changes and denaturation of proteins. Studies of pressure effects on surface-enhanced resonance Raman scattering promises greatly improved sensitivity in the study of these materials under pressure.

#### *Chemical studies*

Studies of pressure effects on chemical reaction kinetics were reported to have led to a better understanding and systematic classification of solvent exchange and ligand substitution reactions of octahedral complexes of transition metals. Some of the other reactions studied under high pressure were Diels-Alder reaction, (C-H-N) hydrogen transfer

reaction and ring closure reactions of transient  $W(CO)_5$  chelate complexes. Application of pressure was reported to have facilitated the synthesis of valuable heterocyclic organic compounds such as diazocoronands and cryptands. Interesting applications of high pressure in organophosphorus and macrocyclic chemistry were reported.

#### *High $T_c$ superconductors*

A number of papers dealt with the pressure dependence of transport properties, lattice parameters and  $T_c$  of various high  $T_c$  superconductors. A study of P-T-x phase diagram of Y-Ba-Cu-O system under high oxygen pressures of up to 0.3 GPa was reported. Two new bulk superconducting phases,  $YBa_2Cu_{3.5}O_{7+x}$  and  $YbBa_2Cu_4O_{8+x}$ , were reported.

#### *Metallic (?) hydrogen*

Results of optical measurements on hydrogen under high pressures of up to 250 GPa (2.5 Mbar) at 77 K were reported. The absorption and Raman spectra provided evidence that the electronic excitations in the visible region began at  $\sim 200$  GPa. At 250 GPa hydrogen samples were opaque. The optical data were consistent with a band-overlap mechanism of metallization.

#### *Metastable phases*

The high-pressure phases of binary alloys such as Zn-Sb, Cd-Sb, In-Sb, Ga-Sb and Al-Ge can be retained metastably at liquid nitrogen temperature for extended periods of time. On heating at 1 atmosphere, the samples attain equilibrium state via different intermediate states, including amorphous state.

#### *Quasicrystals*

Formation of quasicrystalline  $Al_4Mn$  and  $Al_6Cr$  upon quenching the melts under high pressure was reported. Two different phases of  $Al_4Mn$  were obtained by changing the pressure. Quenching of melt at high pressure was reported to yield a new phase of  $Mn_4Si$  which exhibited twelve-fold symmetry.

### Phase transitions

Pressure-induced phase transitions in a variety of compounds and elemental solids were reported. The semiconductor compound GeTe was examined under pressures of up to 25 GPa, and was found to undergo a continuous rhombohedral-cubic phase transition. The lattice parameters  $c$  and  $a$  of the hexagonal cell (associated with the rhombohedral cell) decrease continuously in the entire pressure range, but the  $c/a$  ratio registers a discontinuity at the transition. New phases of silica were reported under high-pressure and high-temperature conditions. On heating  $\alpha$ -quartz or fused silica at pressures above 100 GPa a phase with  $\text{CaCl}_2$ -type structure was obtained. On heating cristobalite under pressure new phases appeared at 10 GPa and 30 GPa.

### Pressure in 20,000 GPa range

Generation of dynamic pressure in the 20,000 GPa

range in an underground nuclear explosion and the measurement of equation of state (EOS) of aluminium, iron and lead were reported. The inadequacy of the Thomas-Fermi model in predicting EOS at such high pressures and the necessity of using modern quantum-mechanical models based on the shell structure of atoms were pointed out. EOS data for a mixture of water, ammonia and isopropanol, and data on electrical conductivity of hydrogen in the pressure range 100–200 GPa were presented. These data provide important inputs in modelling the planet Uranus.

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## SECOND INTERNATIONAL CONFERENCE ON ANALYTICAL CHEMISTRY IN NUCLEAR TECHNOLOGY

The meeting was held in Karlsruhe, FRG, from 5 to 9 June 1989. It focused on analytical techniques applied to the nuclear cycle. Many new laser-based techniques, such as time-resolved spectrofluorimetry and photoacoustic spectroscopy, were discussed. There were also papers on non-destructive and in-line analytical techniques such as multiplexed fibre-optic spectrophotometry, in-line flow coulometry and X-ray absorption edge densitometry.

Two papers from the Indira Gandhi Centre for Atomic Research, Kalpakkam, were also presented (T. R. Mahalingam). These were on the determination of trace metals in uranium by ICP-MS, and on the application of an electrochemical hydrogen meter in studies of reactions in liquid sodium.

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