PREFACE

Soft Chemistry has brought in a.renaissance in the preparative Chemistry and thus is of immense utility in the development of new metastable phases which are not possible from thermodynamic stable polymorphs. The concept of intercalation phenomenon is applied to topo-chemical reactions where in guest species come in reversibly to fill in the empty sites, tunnels or layers of host crystal lattice thus giving interesting opportunity for tailor made modifications of properties of layered solids. It deals not only with intercalation-deintercalation reactions but also with grafting-pillaring, polycondensation of solid units or molecules through acid-base reactions and sol-gel processes.

Soft Chemistry routes allow better control of homogeneity in multicomponent systems and dispersion of dopants or active component synthesis of nano-particles and regulation of oxygen-vacancy concentration.

In chapter one, utility of soft chemistry has been discussed where in intercalation phenomenon has been applied in reversible uptake its intercalates such as lithium ion in re-chargeable battery. Soft chemistry applications for new layered compounds have been discussed. In second chapter, role of non-stoichiometry and soft chemistry in the preparation of advanced catalysts have been discussed with examples of different classes of catalytic materials based on complex oxides. Catalytic behaviour is often associated with the presence of defect structure in which non-stoichiometry alters bulk and surface properties. Creation of these functional properties is strictly related to the possibility of synthesis by soft chemistry routes. In the next chapter layered nano-architectures between cationic and anionic materials using many functional molecules such as polyions, proteins, lipid membranes were studied. Systematic comparision of enzymatic activity and related properties between polyion-protein assemblies and lipid-protein assemblies using lactate dehydrogenase (LDH) and alcohol dehydrogenase (ADH) along with polycations, polydiallyl dimethyl ammonium chloride (PDDA) and artificial cationic lipid were studied employing various techniques.

The fourth chapter deals with controlled ion migration tunning of semiconductor electrical properties. Electromigration of lithium in silicon or germanium and changes in semiconducting electrical properties were studied using electron beam induced current (EBIC) technique. EBIC contrast & super imposed line scan of electric field induced structure created in Si-Li & $CuInSe_2$ were investigated. AFM and scanning spreading resistance (SSR) images of submicron device structure were also studied.

In this last chapter, inclusion compounds having molecular level spaces accommodating low dimensional and anisotropic assemblies have been discussed. Cyclic processes proceeding via radical mechanism have been cited. Representative one or two dimensional polymerization have been summarized. Stereoregular polymers resulting from inclusion polymerization have been prepared and process has been discussed on the basis of chiral and sequential carbon chains.

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ACKNOWLEDGEMENTS

I thank Prof. Gero Decher, Strasbourg, France; Prof. A. Vaccari, Bologna, Italy; Prof. Yuri Lvov, Ruston LA, United States of America and Prof. Gunter Schulz Ekloff, Bremen, Germany for suggesting alternate names as they had other commitments.

I also express my gratitude to Director, Bhabha Atomic Research Centre and Director, Chemistry and Isotope Group of the Centre for permitting me to consult Centre's library.

Finally I record my grateful appreciations to Trans Tech Publications for understanding editor's predicament due to last minute inability of invited scientists to oblige him with their contributions.

About the Editor

Rajendra P. Agarwala graduated from Agra University, India and got his M.Sc. in Physical Chemistry in 1950 and then went to Imperial College of Science, Technology and Medicine, London and secured Ph.D (Lond. Univ.) in Applied Physical Chemistry and D.I.C. in 1953. He returned to India in 1954 and joined National Chemical Laboratory, Poona. In 1955, he was appointed in Atomic Energy Establishment Trombay (now known as Bhabha Atomic Research Centre) and worked on Defect and Diffusion in Metals and Alloys, Radiation Damage in Metals and Alloys, Metallurgical Coatings and Thin Films in various positions.

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He has a handsome number of publications in International journals and has enjoyed high positions in National Professional Societies. He has been on the International Advisory Committee of International Conferences and Editorial Advisory Board of number of International Journals. He was member of Thin Films Division of International Union of Vacuum Science, Techniques and Applications (IUVSTA). He is the editor of Diffusion Processes in Nuclear Materials published by Elsevier Science Publishers B.V., Amsterdam. He is also editor of Surface Coatings for Advanced Materials and Lasers in Materials Science published by Trans Tech Publications Ltd., Uetikon-Zuerich and Special Defects in Semi-Conducting Materials published by Scitec Publications, Uetikon-Zuerich.

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