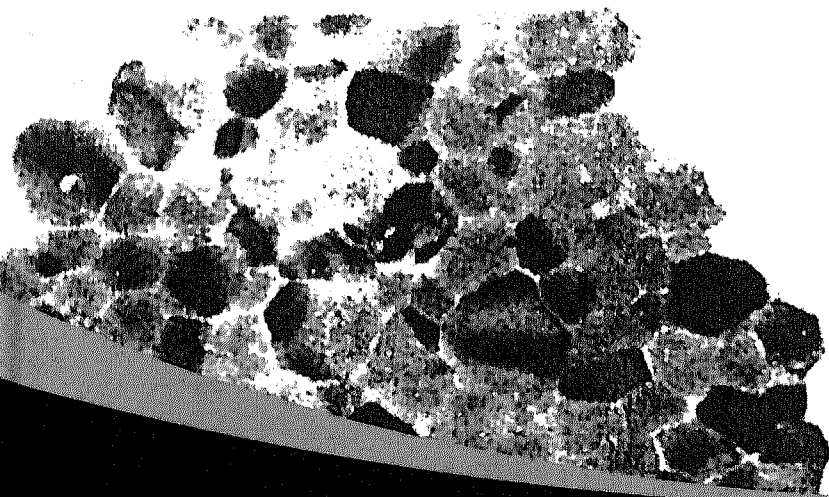




Chemistry of
Nanocrystalline Oxide Materials
Combustion Synthesis, Properties and Applications



K C Patil
M S Hegde
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Dedicated to our spouses

Prabha Malati Sanjay Mahesh
(KCP) (MSH) (Tanu) (STA)

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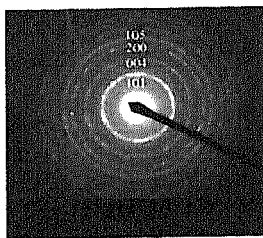
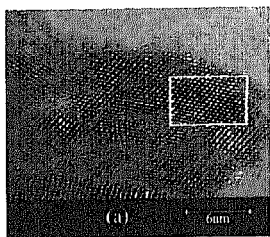
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Chemistry of **Nanocrystalline Oxide Materials**

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Nanoscience and Nanotechnology have captured the imagination of people worldwide and nanochemistry has stirred tremendous interest. The term, "Nanotechnology" was coined by a Japanese engineer, Nario Taniguchi in 1974. Eric Drexler in his book "*Engines of Creations*" published in 1986 envisaged the building of molecular machines by bringing atom by atom in a precise manner to make many simple desired systems. However, Drexler's dream continues to be implausible since the laws of chemistry do not easily allow this kind of assembly at the molecular level. The challenge facing nanotechnologists today is in designing fine grained structures, unlike biomolecular structures. A bigger confrontation is to merge the science intensive process with its engineering aspect. In this context the present book on *Chemistry of Nanocrystalline Oxide Materials* is a step closer to this challenge.

Nanocrystalline oxides exhibit interesting magnetic, dielectric, optical and catalytic properties and find applications as sensors, pigments, phosphors and catalysts for air and water purification. Prof. Patil and his colleagues at IISc, Bangalore, have developed an original low temperature initiated self propagating synthetic route by solution combustion and combustible precursors processes. A characteristic feature of this process is in preparing homogenous multicomponent oxide powders of desired composition, structure and properties. Also, doping of impurity metal atoms/ions in an oxide matrix producing nano composite materials is achieved instantaneously in a single step.

'Combustion synthesis' has generated great interest among chemists, physicists and materials scientists because of its ease and rapidity as compared to the traditional cumbersome powder synthesis methods. This book on "*Chemistry of Nanocrystalline Oxides*" serves as a reference manual/monograph for the preparation of all types of oxides and is expected to be useful to students and researchers of nanomaterials alike. It also provides industrial units a unique opportunity to upscale this process into technology and exploit its myriad potential applications.

This process heralds an exciting era in Nanochemistry.

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