From the Editor's Desk

Amorphous and glassy semiconductors in material science application form a central theme in the development of new application devices. Professor Asokan has edited this issue and has brought out the latest research potential in this area and on behalf of the editorial committee I express my sincere thanks. Time and again amorphous and glassy materials in the solid state have proved to exhibit better and enhanced properties than their crystalline counterparts and the articles in this issue highlight this aspect with suggestions towards the design of futuristic materials in the area of semiconductors. The next couple of issues will be guest edited by two of our colleagues, Professor Jaywant Arakeri from the department of mechanical engineering and Professor G. Mugesh from the department of Inorganic and Physical Chemistry on extremely current topics in their area of research and the readers can eagerly look forward to these reviews.

T. N. Guru Row
Editor
ssctng@sscu.iisc.ernet.in

Editorial

Physics and Applications of Amorphous Semiconductors—Recent Advances

Non crystalline semiconductors (both in thin film amorphous and bulk glassy form) exhibit many interesting electrical, thermal, structural and optical properties. Some of the fascinating properties of these materials include variable range hopping of charge carriers, electrical switching, double glass transition & double stage crystallization, photo conductivity, photo darkening & photo bleaching, rigidity percolation, chemical ordering, etc. These interesting properties find applications in a variety of fields such as reprography, solar cells, infrared optics, information storage, etc. In particular, the phenomenon of electrical switching in glassy chalcogenides has been exploited in Non Volatile Random Access Memories.

This special issue of the Journal of Indian Institute of Science, consisting of six articles highlights the recent advances in the physics and applications of amorphous and glassy semiconductors. The first article by Anbarasu and Wuttig provides an understanding, based on the local structure, of the properties of phase change glasses for data storage applications. In the second paper, Matthieu Micoulaut and Christophe Bichara, discuss the structure and topology of phase-change telluride melts, which are although different from Ge-rich alloys, used in phase-change applications. The third paper by Sanjiv reviews the applications of hydrogenated amorphous silicon (a-Si:H) in large area electronic systems, bringing out clearly the problems associated with a-Si:H based thin film transistors from a circuit designer's perspective and strategies to overcome these problems.

The article by Sangunni presents the basic idea of photo-induced effects in chalcogenide glasses and multi layers, which find applications in opto-electronics. Sevi Murugavel and Manisha Upadhyay have reviewed in their paper, the existing macroscopic and microscopic models of AC conductivity in amorphous semiconductors. The last paper by Asokan and Lakshmi attempts to summarize the dependence of the electrical switching behavior of chalcogenide glasses on other material properties such as network topological effects, glass transition & crystallization temperature, activation energy for crystallization, thermal diffusivity, electrical resistivity & conductivity activation energy, etc.

I am hopeful that this special issue will provide an overview of the recent developments in field of amorphous and glassy semiconductors, covering both fundamental and applied aspects.

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Prof. S. Asokan
Department of Instrumentation and Applied Physics
& Applied Photonics Initiative
Guest Editor
sasokan@isu.iisc.ernet.in