THIN FILM TECHNOLOGY

The inclusion of thin film technology to the fabrication of solar cells is intended towards the miniaturization of already existing devices. Thin films have already been utilized in the field of visual display units in the active elements in Thin Film Transistor monitors. Their dramatically reduced size compared to ordinary CRT monitors and their reliable operation at considerable lower power consumption levels are the proof of how successfully thin films can be utilized in technological applications. Although thin films were discovered more than a century ago, extensive study on thin films became possible only after major advances were made in vacuum technology, since high vacuum is a general necessity for ensuring good quality of thin films. Today they are extensively used for the fabrication of various miniaturized devices like solar cells, reflection and antireflection coatings etc.

I our modern age of technology we are familiar with different appliances and devices. The devices having thin films as the preliminary components are costly. It is due to the requirement of expensive instruments or technology for their synthesis. The purity of the samples also is a critical factor. At this stage the requirement of an easy, cost effective and a friendly technique for their fabrication arises.

The definition of a thin film as a 3D structure with its thickness several orders lower in magnitude compared to its other two dimensions suggests that they can conveniently be prepared by depositing the relevant material prepared in the atomic, ionic or molecular form on substrates of an appropriate material in a layer by layer fashion. Preparation of any thin film must thus include various steps like production of appropriate atomic, ionic or molecular species, their transport to the substrate through a medium and the condensation of the species on the substrate. The formation of thin film takes place via nucleation and growth process. The growth process is basically a statistical process consisting of nucleation, surface diffusion and the controlled growth process. The growth process is basically a statistical process consisting of nucleation, surface diffusion and the controlled growth of a three dimensional network structure consisting of the relevant nuclei. Thin film can be prepared from and on a variety of materials such as metals, insulators and semiconductors for various purposes. Different

methods employ all the three phases of matter – solid, liquid and gas, although only the deposition from liquid and vapor phases is of practical importance. There are broadly two methods known as physical method and chemical method for thin film preparation. Physical methods rely on thermodynamics or mechanical means of getting the relevant species in the appropriate phase and their deposition on to substrates, whereas in chemical methods, film deposition takes place either by gaseous phase or liquid phase chemical processes.

In optoelectronics and photovoltaic applications the nature and type of semiconductors play an important role. The same material can show different structural, electrical and optical properties according to the deposition techniques and the nature of precursors used. For device applications we have to optimize these properties.