# Editor's Note

Luminescent phenomena have fascinated mankind since the earliest times. The light from the aurora borealis, glow worms, luminescent wood, rotting fish and meat are all examples of naturally occurring luminescence. E. Newton Harvey's 770 page volume "A History of Luminescence: From the Earliest Times until 1900" is a classic work of global dimensions which narrates interesting stories from ancient cultures to modern times.

This special volume consists of eight chapters consisting of seven Review papers and one Research paper. "Luminescence Phenomena: An Introduction" is the first Chapter contributed by KVR Murthy and HS Virk. It explains the basic phenomenon of Luminescence: "Luminescence is "cold light", light from other sources of energy which can take place at normal and lower temperatures. The word luminescence was first used by a German physicist, Eilhardt Wiedemann, in 1888. In Latin 'Lumen' means 'light'. The materials exhibiting this phenomenon are known as 'Luminescent materials' or 'Phosphors' meaning 'light bearer' in Greek. Luminescence is basically a phenomenon of emission of light from an insulator followed by prior absorption of energy from ionizing radiations like, X-rays, alpha, beta and gamma radiations. The energy lifts the atoms of the material into an excited state, and then, because excited states are unstable, the material undergoes another transition, back to its unexcited ground state, and the absorbed energy is liberated in the form of either light or heat or both. The excitation involves only the outermost electrons orbiting around the nuclei of the atoms. Luminescence efficiency depends on the degree of transformation of excitation energy into light, and there are relatively few materials that have sufficient luminescence efficiency to be of practical value".

Chapter 2 "Thermoluminescence and its Applications: A Review" is written by KVR Murthy. The author has discussed the theory of thermally stimulated luminescence, and applications to diverse scientific disciplines such as radiation dosimetry, archaeology, geology, medicine, solid state physics, biology and organic chemistry. Applications in terrestrial and extra-terrestrial domain are also discussed. Low Temperature Thermoluminescence (LTTL) applications to Rice, and some spices like, Coriander, Turmeric, and Tamarind constitutes a separate section of this chapter. The author has reported some interesting results of TL dosimetry characteristics of salt crystals from Indian pickles.

Chapter 3 reviews "Recent Advances and Opportunities in TLD Materials". The basic demands of a thermoluminescent dosimeter (TLD) are good reproducibility, low hygroscopicity, and high sensitivity for very low dose measurements and good response at high doses in radiotherapy and in mixed radiation fields. In this review, authors have discussed the past developments and the future opportunities in TLD materials and their efforts to make better future use of low cost materials in TLD applications. Synthesis and characterization of TLD materials as phosphors has been achieved.

Chapter 4 "Luminescence Dating: Basic Approach to Geochronology" is contributed by Naveen Chauhan. This review article focuses on the different aspects of luminescence dating, covering basic theory behind luminescence and luminescence dating, procedural aspects, complications and issues of luminescence dating and future perspective. If analyzed scientifically, each grain of sand has secrets to unfold. One such secret is unfolded by stimulated luminescence emissions from sand sized grains. The technique can be used to

investigate burial history of the grain and its surrounding environment by estimating the time of last light or heat exposure and correlating it with climatic or geological changes. The luminescence dating technique has revolutionized field of geochronology and is one of the fastest growing techniques in past three decades.

Chapter 5 “Elastico-Mechanoluminescence of Thermoluminescent Crystals” contributed by BP Chandra et al. reports the elastic-ML of thermoluminescent crystals such as X- or γ-irradiated alkali halide crystals, ZnS:Mn, and ultraviolet irradiated persistent luminescent crystals. Both the elastico-mechanoluminescence and thermoluminescence arise due to the de-trapping of charge carriers. Mathematical theory of the elastico-ML of Crystals is discussed and a good agreement is found between the experimental and theoretical results. The application of the elastico–ML of thermoluminescent crystals in light sources, displays, imaging devices, sensing devices, radiation dosimetry and in non-destructive testing of materials are discussed.

Chapter 6 “Thermoluminescent Phosphors for Radiation Dosimetry” written by BC Bhatt and ML Kulkarni deals with the synthesis of a variety of TL Phosphors and their use in radiation dosimetry, which has found many useful applications in various fields, such as personnel and environmental monitoring, retrospective dosimetry, medical dosimetry, space dosimetry, and high-dose dosimetry. Specific features of TL phosphors for thermal neutron, fast neutron and high-energy charged particle dosimetry are also considered. Some of the recent developments in the field of optically stimulated luminescence (OSL) and radiophotoluminescence (RPL) are discussed. Comparisons of TL characteristics of phosphors prepared by different methods are summarized by the authors in tabulated form.

Chapter 7 “Use of OSL and TL of Electronic Components of Portable Devices for Retrospective Accident Dosimetry” by AS Pradhan and collaborators deals with an interesting area of application of TL due to growing apprehensions of radiological accidents and terroristic attacks. Among the studied components (resistors, resonators, ICs, capacitors, inductors, antenna switches etc.) of personal objects (mobile phones, USB flash drives, MP3 players etc.), the resistors of mobile phones with $Al_2O_3$ substrates exhibited higher sensitivity, smaller sample to sample variation and high reproducibility of OSL signals. Chapter 8 “Optical and Morphological Studies of Doped Core Shell ZnS:Cu/ZnS Nanoparticles” by Amandeep and Manoj presents some results of study based on applications of ZnS core shell quantum dots (QDs) doped with Cu. Photo Luminescence Studies of these nanoparticles show high quantum yields and attractive optical properties.

It is my pleasant duty to offer my thanks to reviewers of Papers, especially Naveen Chauhan and KVR Murthy, and those authors who tested my patience by late submissions. Trans Tech Publishers deserve my appreciation for timely publication of this special volume.

Hardev Singh Virk
Editor