Editor Note

The credit of introducing Solid State Nuclear Track Detectors (SSNTDs) as a powerful research tool in the early sixties goes to P.B. Price, R.L. Fleischer and R.M. Walker of the General Electric Company of the United States of America. Basically, SSNTDs are dielectric materials or solid insulators such as mica, glass, synthetic plastics, etc. which record and permanently store the trajectory of fast moving charged particles in the form of submicroscopic trails of continuous damage called latent tracks. Today, there is hardly a branch of science and technology where these detectors do not have an actual or potential application. Apart from the direct applications of far reaching consequences in nuclear physics, SSNTDs have been used in diverse fields, e.g., bio-medical sciences, environmental research, geological sciences, materials science, micro-analysis, nuclear imaging, nuclear technology, space physics, micro/nano electronics, uranium prospecting and oil exploration, etc. Quite possible, we may find newer applications in future.

The present Volume consists of one dozen Papers on Applications of SSNTDs in various fields; Radon Studies covering more than half of this Volume. First Paper, "Neutron Spectrometry and Dosimetry using CR-39 Detectors" by SP Tripathy explores that CR-39 detector has been found to be effective and convenient for neutron measurements, particularly in pulsed and mixed radiation fields such as in particle accelerator environments. Microwave induced chemical etching (MICE) technique, recently introduced for rapid and efficient processing of track detectors is discussed in this paper. Second Paper, "Cosmic Radiation Detection by Solid State Nuclear Track Detector Technique" by Pálfalvi and Sajó-Bohus tries to provide a short summary about fundamentals and applications of cosmic radiation studies using SSNTDs; well suited for personal dose measurements to determine radiation risk of astronaut during either external or internal vehicular activities.

The next Seven Papers deal with applications of SSNTDs in Radon studies for indoor measurements (Garcia-Tobar et al., Guillermo Espinosa et al., and Mostafa Yuness et al.), Hydrocarbon exploration (Daniel Palacios et al.), Radon-Thoron measurements (BK Sahoo and BK Sapra), Radon decay products detection (Rosaline et al.), and a Review of Radon Research in Poland (Tadeusz A. Przylibski). Daniel Palacios et al. have established that SSNTD is one of the recognized techniques to be employed advantageously in radon surveys for hydrocarbon exploration and occurrence of natural gas seeps. Sahoo and Sapra Paper analyses the results of the conventional bare mode as well as the latest twin cup mode of SSNTDs. Rosaline et al. focus on the development of passive detection system for the decay products of Radon-Thoron known as depositionbased Direct Radon and Thoron Progeny Sensors. Garcia-Tobar et al. used Wavelet analysis for study of indoor Radon behaviour between one occupied and one unoccupied dwelling in Madrid. Mostafa Yuness et al. measured indoor activity of short-lived radon progeny as a critical parameter in dose assessment. Espinosa et al. measured radon and thoron concentration distribution inside a cellar using nuclear track detectors.

West and Kearfott present a simple conceptual model for optical absorption transitions in OSL materials along with a basic mathematical model for delayed luminescence in their Paper, “Optically Stimulated Luminescence Dosimetry: An Introduction”. Diwan and Virk in their Paper, “Heavy Ion Range Measurements in SSNTD Materials: A Review” discuss an inter-comparison between the measured range values of different laboratories and through different range measurement methods. The reliability and validity of most commonly used theoretical and semi-empirical/empirical range formulations are highlighted.

In the last Paper, “Energy Loss for Swift Heavy Ions in Different Elemental Absorbers: A Different Approach for Effective Charge Parameterization” Rani et al. present a new formulation for calculation of the effective charge without any empirical/semi-empirical parameterization. The energy loss for swift heavy ions, covering Z=3-29 (~0.2 - 5.0MeV/n), has been calculated in the elemental absorbers like C, Al and Ti.

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