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Some Applications of Novel Polycarbonate/ACF Radon Detectors for Personal and Environmental Monitoring

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Polycarbonate track detector (PCTD) have found wide applications in particular when used in radon monitoring cups [1-3]. In order to overcome some deficiencies such as long-term exposures required, recently Tommasino and coworkers [4] introduced a novel Activated Carbon Fabric (ACF)/CR-39 detector in which the ACF adsorbs radon on its active sites and exposes the CR-39; when CR-39 is chemically etched leads to an ACF/CR-39 response significantly enhanced[4]. Using the ACF combined with PCTD, Sohrabi and Ebrahiminezhad have recently introduced electrochemically-etched (ECE) PCTD/ACF multi-function radon individual and environmental monitors[5-7]. A comparative PCTD/ACF and PCTD/bare method was applied which also introduced an amplification factor (AF) which can be correlated to radon/progeny equilibrium factor, yet to be further studied and calibrated. The PCTD/ACF registers alpha particles from radon adsorbed on its carbon active sites at a higher rate than that of PCTD/bare which registers alphas from radon and progeny. The ratio of PCTD/ACF tracks to that of PCTD/bare leads to a track density ratio or amplification factor (AF) ≥ 1[5-7]. In this line of development, the methods have been successfully studied for individual and environmental radon monitoring in air as well as radon and radium-226 monitoring in water. In particular, a novel mega-size radon monitoring method using a mega-size radon PCTD detector (33 x 75 cm2) [8], processed in a mega-size single-cell ECE image processing system[9], for large area radon monitoring. Another novel development is Long Strip Polycarbonate Radon Monitor with or without ACF methodology processed in a novel Long ECE Image Processing Chamber developed in this research for continuous monitoring of radon; e.g. over a long wall. In this paper, the highlights of such developments are presented and discussed.

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