Organic materials for next-generation radiation detectors

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There is increasing interest in the application of organic materials for use in radiation sensors, driven during the last decade by the rapid development and growth of these materials for electronic applications. Organic materials possess a unique set of electronic, optical and physical characteristics that have been applied across a range of consumer electronics and photovoltaic applications. The growing interest in the use of electronic-grade organic materials as radiation sensors is due to their ability to realize low cost, large area detectors with particular applications in medical imaging and dosimetry. However as these device technologies become more mature there are numerous other potential application areas for these detectors including neutron physics, high energy physics, and security applications. Organic materials have the potential to be used as low cost, large area radiation sensors with applications in a wide range of radiation detection fields. I will present the current status of various classes of organic radiation detectors including thick-film polymer X-ray detectors which have been developed as tissue-equivalent X-ray dosimeters, organic metal-halide perovskite crystals for X-ray and gamma detection (which form a large family of materials of the form $CH_3NH_3MX_3$), and the use of nanoparticles as high luminosity organic scintillators.