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Light in dark places, radiation sensing and extremes: carbonaceous media for luminescence-based surface dosimetry

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Present work continues research into the viability of commercially available small dimension carbonaceous media for ionizing radiation dosimetry and radiation damage studies, in part examining the relationship between structural alterations, surface-area-to-volume ratio and carbon content. Dose dependency characterizations have been undertaken for rods and sheets for a range of sources, energies and dose, as for example in determining responses in use of 60Co irradiations delivering doses from 0.5 Gy to 20 Gy. Dependency variation can be viewed using a range of dose-sensitive techniques, including the Raman intensity ratio ID/IG, with D signifying defect density and G that of graphite, the ratio reflecting the dominating effect of defect generation and dose-driven defect annealing. Of the various media investigated, that possesing the greatest surface area-to-volume ratio perhaps unsurprisingly also exhibits the greatest thermoluminescence yield per unit mass. In respect of medical dosimetry we have sought to confront the challenge posed in matching skin thickness with skin dose, the near tissue equivalence of several promising skin dosimeters also being discussed.

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