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## Effects of high dose rates from sub-10-Gy ultrashort electron pulses on the yields of fluorescence chemical dosimeters

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In the past, the effects of high dose rate of low-LET radiation on the radiation-chemical yields of liquid chemical dosimeters have been systematically studied only for the case of microsecond-length pulses that delivered high peak doses ( $> 100$  Gy). In this study, yields of four different chemical dosimeters were determined at very high dose rates ( $\sim 10^{12}$  Gy/s) but at low peak doses ( $< 20$  Gy) delivered by picosecond electron pulses (ELYSE, Université Paris-Saclay) and were compared with yields determined under low dose rate radiation from a Co-60 gamma ray source (at  $\sim 10^3$  Gy/s). In addition to the ferrous sulfate (Fricke) dosimeter, three established fluorescence dosimeters were utilized –terephthalic acid, trimesic acid and coumarin-3-carboxylic acid (C3CA). The Fricke dosimeter was used as a reference as it was determined that its chemical yields were not significantly affected by the high dose rates at low doses. The yields of the terephthalate and the trimesic acid dosimeters showed no changes with the elevated dose rate; however, the yield of the coumarin (C3CA) dosimeter suffers a marked drop (-60%). The dissimilar behavior can be explained by differences in the kinetic parameters of the multi-step mechanism of the formation of fluorescent products.

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