Contribution ID: **1033** Type: **Verbal**

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

Thursday, 19 May 2022 14:20 (20 minutes)

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 (~10¹² 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 ~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.

Primary authors: Dr PRECEK, Martin (ELI Beamlines (FZU CAS)); Dr KUBELIK, Petr (J. Heyrovský Institute of Physical Chemistry of the CAS, v. v. i.); Dr VYSIN, Ludek (FZU - Institute of Physics of the CAS); Dr SCHMIDHAMMER, Uli (Institut de Chimie Physique/ELYSE, Université Paris-Saclay); Mr LARBRE, Jean-Philippe (Institut de Chimie Physique/ELYSE, Université Paris-Saclay); Mr DEMARQUE, Alexandre (Institut de Chimie Physique/ELYSE, Université Paris-Saclay); Mr JEUNESSE, Pierre (Institut de Chimie Physique/ELYSE, Université Paris-Saclay); Prof. MOSTAFAVI, Mehran (Institut de Chimie Physique/ELYSE, Université Paris-Saclay); Dr JUHA, Libor (Institute of Physics & Institute of Plasma Physics of the CAS)

Presenter: Dr PRECEK, Martin (ELI Beamlines (FZU CAS))

Session Classification: Radiation Chemistry

Track Classification: Radiation Chemistry