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***In situ* generation of ultrafast transient “acid spikes” in the $^{10}\text{B}(n,\alpha)^7\text{Li}$ radiolysis of water**

by

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ABSTRACT

Monte Carlo track chemistry simulations of the $^{10}\text{B}(n,\alpha)^7\text{Li}$ radiolysis of water show that the *in situ* formation of H_3O^+ by the two He and Li recoiling ions renders the native track regions temporarily very acidic. For these irradiating ions, the pH remains near 0 at times less than ~ 100 ps after which the system gradually returns to neutral pH at ~ 0.1 ms. These “acid spikes” have never been invoked in water or in a cellular environment exposed to densely ionizing radiations. The question of their implications in boron neutron capture therapy and, more generally, in hadrontherapy, is discussed briefly.

Keywords: $^{10}\text{B}(n,\alpha)^7\text{Li}$ nuclear reaction, α and Li recoil ions, liquid/cell water, radiolysis, H_3O^+ radiolytic yield, pH, acid spike, Monte Carlo track chemistry simulation, boron neutron capture therapy (BNCT), hadrontherapy.

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