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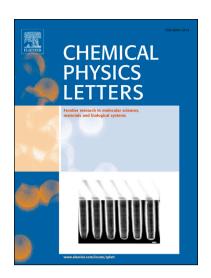
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ACCEPTED MANUSCRIPT

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

by

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ABSTRACT

Monte Carlo track chemistry simulations of the ${}^{10}B(n,\alpha){}^{7}Li$ 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 B $(n,\alpha)^7$ 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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