

Electron mediated nuclear chain reactions

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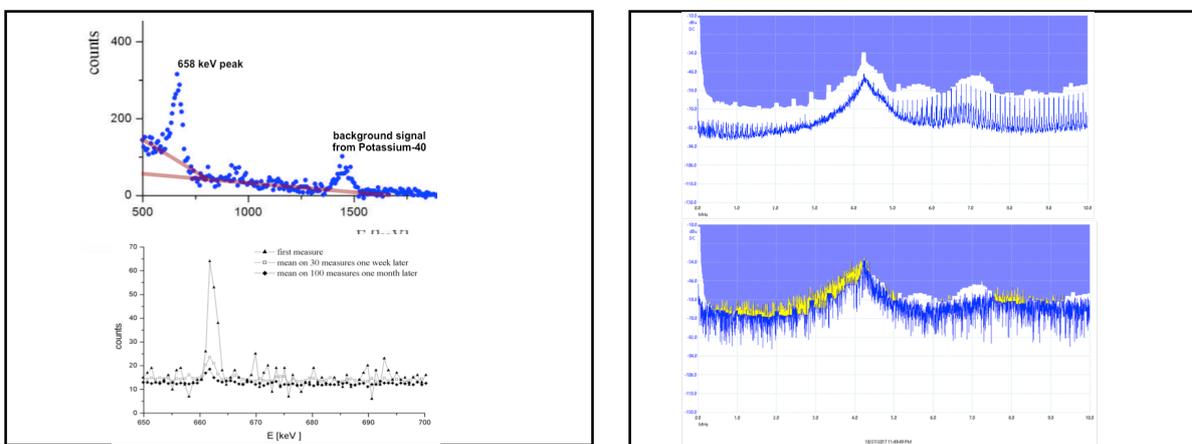
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Up to now, only neutron-mediated chain reaction of heavy nuclei has been conceptualized and investigated, which is the basis of all current nuclear energy production. Here, we introduce the concept of electron mediated reactions. We propose that (i) This class of nuclear reaction is initiated by the nuclear capture of energetic electrons; and (ii) The reaction may generate a higher number of energetic electrons as the output.

Upon the re-evaluation of relevant past experimental results [2, 3], we find that the reaction signatures are compatible with the herein proposed reaction process. Furthermore, in a previous publication [1], we have investigated ⁵⁸Ni containing alloys and ⁶Li - ⁷Li mixtures as possible fuels for electron mediated nuclear chain reactions and shown experimental evidence for an exothermic nuclear reaction in which the observed experimental details are also consistent with the herein proposed process. To understand the aforementioned experiments, possible electron mediated reactions in metallic solid states are discussed, which are fuelled by either nickel or lithium. We believe in this process the energetic electron capture and multiplication steps are indispensable to interpret experimental results.

In the talk, complementing the theoretic discussion, we will present experimental evidence from relevant experiments in literature, as well as our own experiments, which implies the possibility of sustainable energy production from metallic nickel or lithium.



Left figure: Measured Gamma signature of the ⁵⁸Ni reaction [2]; 500-2000 keV spectrum (top) and precise measurement of the gamma emission peak (bottom)

Right figure: Measured RF signature of the ⁵⁸Ni reaction in the 0-10 MHz range [1]; background signal (top) versus ongoing reaction (bottom)

[1]A. Kovacs et al “Exothermic Reactions in the Partially Molten Li–Ni–Cu Alloy”, J. Condensed Matter Nucl. Sci. 25 (2017) 159–180

[2]S. Focardi et al “Evidence of electromagnetic radiation from Ni-H Systems”, proceedings of the ICCF-11 International Conference on Condensed Matter Nuclear Science, Marseille, France (2004)

[3]H. Ikegami et al “Observation of enormously enhanced nuclear fusion in metallic Li liquid”, report number EFA 05/12, project number P20628-1, Uppsala University (2005)