Nuclear transmutations are better facilitated by alloys over pure metal cathodes in electrolysis.

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Recently, various studies have shown Nuclear signatures in low energy physical and chemical processes ("Cold fusion" edited by Jean-Paul Biberian). One of the most effective methods to realize low energy nuclear reactions (LENR) is via electrolysis. Our primary objective is to explore the importance of alloys as opposed to pure metals as cathodes for LENR. To explore this question, we evaluated four systems: Pure Ni, pure Cu, Ni-Fe alloy (Ni 93% and Fe 7% WDS) and Kanthal (Fe 74%,Cr 21% and Al 5%).

The electrolysis setup uses very pure graphite (99.99%, impurity < 0.01% by WDS) for anode, and metal (alloy) wire/strip as cathode. 1 molar potassium carbonate (99.995% by trace metal analysis) aqueous solution is the electrolyte and the system is biased at 20 V, 1 A for 10 hours or so. We employ highly sensitive X-ray spectroscopy (EDS and WDS) and mass-spectroscopy characterization (TOF SIMS) to characterize the elemental composition and isotopic variations on the cathode before and after the electrolysis.

Elements like Ni and Ni-Fe transmute to Cu, Fe, and Mg. Isotopic shifts are also observed in Ni and Cu which forms undeniable proof of transmutations in metal after electrolysis.While confirming transmutations, the electrolysis experiments reiterate that the macroscopic control of electrochemical conditions (like potential bias, time, amount of current) do not provide an adequate control on the microscopic nuclear environment. Hence, with the same macroscopic parameters, there are variations in nuclear transmutations rates.

Overall, our experiments show that it is easier to induce nuclear transmutations in alloys as compared to pure metals. Currently, we are exploring the underlying reasons for the effectiveness of alloys.