The Theorist's Role in Unravelling Cold Fusion Physics

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If we are to unravel the cold fusion process, we need to comprehend it at a more fundamental level than calorimetry. Consider the possibility that cold fusion might consist of the three sub-processes:

Process Rank	Process Description	Reference
Tertiary process	Excess heat generation	Fleischmann and Pons
Secondary process	Nuclear transmutations	Mizuno and Miley
Primary process	Energy accumulation & storage	LANP model

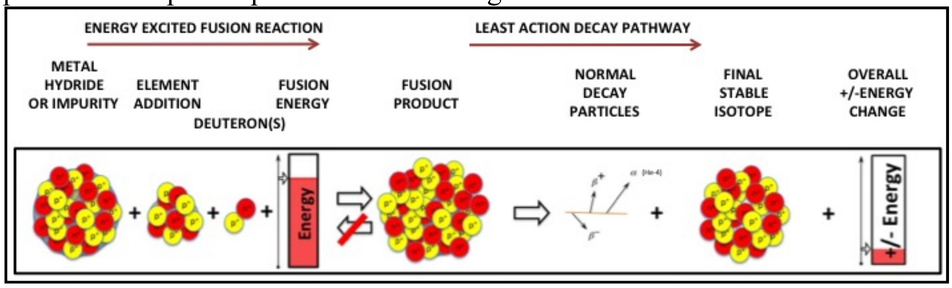
In this presentation, we develop a methodology for measuring the secondary process, and in particular observing the time history of individual nuclear transmutation events.

The experimental hypothesis is: *LANP theory predicts the order in which specific nuclear transmutations occur in a thin film nickel electrode.*

The experiment is designed to also answer four questions:

- Exactly what types of nuclear transmutations are occuring? Fusion? Fission? Decay?
- How are protons and neutrons implicated? Do they participate? Do they catalyse?
- Do observed transmutation events support excess heat measurements?
- Are both fusion and fission occuring? Can we isolate single transmutation events?

The theorist's view of nuclear transmutations differs from the experimentalist's. While the experimentalist focuses on measuring initial electrode composition and the transmutation end products, the theorist is more interested in the story of how the process developes from natural laws. In this paper we develop an experiment that is designed to observe an isolated nuclear transmutation.



The Least Action Nuclear Process theory is used to develop an experimental hypotheses that specifies the time sequence of initial nuclear transmutations in a thin film nickel electrode made from 99.999% fine Ni-58 and a single, mono-isotopic element impurity such as 99.999% fine Sc-45.

The theory provides energetic calculations for the initial fusion transmutation, followed by a decay proceess along the path having the smallest energy change. The experiment is designed to measure the isotope composition of a thin film (Ni coated glass beads) electrode at intervals determined in pre-experiment trials. The measurements are then compared to LANP model calculations that were prepared during the experiment's planning phase.

TABLE 7 – PURE NICKEL-58 ELECTRODE WITH PURE SCANDIUM IMPURITY AND ONE OR TWO HYDROGEN

Host Metal	Impurity	Protons	Fusion Product		Decay Product		Energy Components: Fusion	Decay	Total
45Sc	+ 45Sc	+ (1)p =>	91Tc	=>	91Zr	=	0.6224 MeV	11.3995 MeV	12.0219 MeV
58Ni		+ (1)p =>	59Cu	=>	59Co	=	2.9075 MeV	5.8713 MeV	8.7788 MeV
45Sc	+ 45Sc	+ (2)p =>	92Ru	=>	92Mo	=	5.8252 MeV	11.3779 MeV	17.2032 MeV
58Ni		+ (2)p =>	60Zn	=>	60Ni	=	7.5160 MeV	9.2624 MeV	16.7783 MeV
45Sc		+ (1)p =>	46Ti	=>	46Ti	=	9.8336 MeV	0.0000 MeV	9.8336 MeV
45Sc		+ (2)p =>	47V	=>	47Ti	=	14.4903 MeV	2.4193 MeV	16.9096 MeV
58Ni	+ 45Sc	+ (1)p =>	104Sn	=>	104Pd	=	-22.9240 MeV	15.7520 MeV	-7.1719 MeV