Abstract

Title: Fluidic-Micro-Nano-Hetro-Structures for Nuclear Power Application

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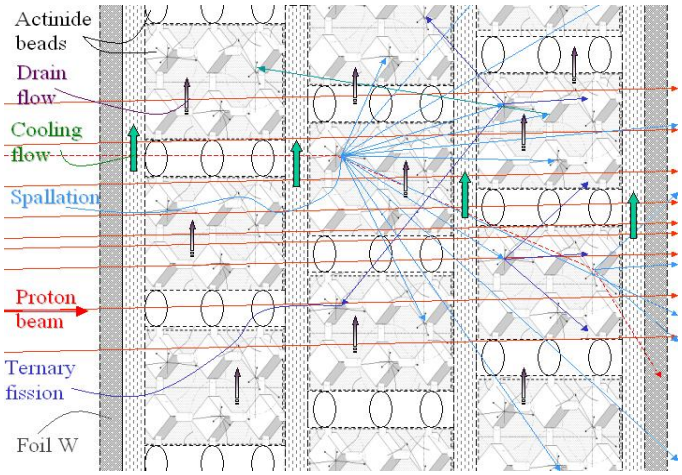
Keywords: micro, nano, fluid, nuclear, hetero, drain fluid, fission, transmutation

I. Abstract Body (up to 250 words)

Nuclear energy development is dependent on new nano-engineered materials incorporating heterogeneity by design, in order to allow higher performances and safety. Fission products occurrence inside nuclear reactors are responsible for low nuclear fuel burnup and fuel damage [1]. Replacing the actual homogeneous Urania ceramic structure with a Ceramic –liquid metal micro structure that self-separates the fission products by trapping them into a drain liquid that may be NaK, PbBi (LBE) preventing them to damage the nuclear fuel and allowing easy fuel reprocessing. Another development relies on nano-cluster properties [2] of enhanced separation of transmutation products resulted from Th or Pu cycle, or production of radioisotopes, that can be used inside nano-clustered-hetero-structure, made of nanobeads of actinides washed by a drain liquid with affinity for the transmutation products resembling a frit. Washed by the nano-flow. In direct nuclear energy to electricity conversion supercapacitor-like devices, the end of range of the nuclear particles create large lattice damage [3], that can be improved using liquid –solid hetero-structures as LiH on MWCNTs that have increased robustness to radiation damage. and sensitive lines.

II. Image:

Micro-Nano-Engineered-Hetero-Structure for fission products separation and transmutation products enhanced extraction, contains a nano-structure embedded into a micro-hetero-structure



III. Reference:

1. White, D.W.a.W., A. H.,, *Irradiation Behavior of Dispersion Fuels.* Fuels Elements Conference, KAPL-P Proceedings, 1957.
2. Popa-Simil L., *Nano-cluster Effect of Defect Super-rejection and Radiation Increased Endurance.* MRS-Spring, 2008. **web**.
3. Zigler J. F., *Stopping of energetic light ions in Elemental Matter.* Journal of Applied Physics, 1999. **85**: p. 1249-1272.

IV. Biography:

Dr. Liviu Popa-Simil, Nuclear Engineer, Physicist, Director of Los Alamos Academy of Sciences. He got B.Sc. in fast breeder reactors, M.Sc. in nuclear engineering, plasma-laser selective chemistry, and PhD in nuclear, atomic, and molecular materials physics at National Institute for Atomic Physics, Bucharest. He worked at Romania's National Institute for Physics and Nuclear Engineering, then at Los Alamos National Laboratory, having 500+ peer reviewed publications, seminaries and conferences, 10+ invention patents, book chapters and published books. He is a member of ANS, MRS, IEEE, ASNT, etc., received the Romanian prize for excellence in 2011, Marquis Who is Who award, etc.

V. Presenting author details

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