

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Radiation-induced ductility enhancement in amorphous Fe and Al₂O₃+TiO₂ nanostructured coatings in fast neutron and high temperature environments of next generation reactors – Brookhaven National Laboratory

SECTION B. Project Description

The effects of fast neutrons on the nanostructured coatings deposited on steel alloy and titanium alloy substrates will be studied with particular focus on ductility restoration and the influence of temperature. Irradiated specimens will be macroscopically analyzed in a thorough post-irradiation evaluation at the Brookhaven Isotope Extraction Facility. Low dose, encapsulated samples will be evaluated at the National Synchrotron Light Source using x-ray based strain and phase mapping to assess the effects of neutron irradiation and temperature.

SECTION C. Environmental Aspects / Potential Sources of Impact

Mixed Waste Generation – Nanostructured coatings on steel and titanium-alloy substrates will be activated by the accelerator beam during irradiation. The activated materials will be handled and properly disposed of by the Isotope Facility staff according to DOE regulations and procedures. The small quantity of mixed waste resulting from this experiment will be included in the mixed waste produced by the isotope extraction process in the facility and disposed properly.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not “connected” nor “related” (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial development.

B3.10 Siting, construction, modification, operation, and decommissioning of particle accelerators, including electron beam accelerators, with primary beam energy less than approximately 100 million electron volts (MeV) and average beam power less than approximately 250 kilowatts (kW), and associated beamlines, storage rings, colliders, and detectors, for research and medical purposes (such as proton therapy), and isotope production, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible), or internal modification of any accelerator facility regardless of energy, that does not increase primary beam energy or current. In cases where the beam energy exceeds 100MeV, the average beam power must be less than 250 kW, so as not to exceed an average current of 2.5 milliamperes (mA).

Justification: The activity consists of analyzing alloys irradiated with an ion accelerator for research purposes.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 8/9/2011