

# DOE-ID NEPA CX DETERMINATION

**SECTION A. Project Title: Radiation tolerance and mechanical properties of nanostructured ceramic/metal composites – University of Nebraska**

**SECTION B. Project Description**

This project will consist of studying the ion irradiation and mechanical response of amorphous Si-C-O and Si-Al-C-O alloys, understanding the role of amorphous-ceramic/metal interface on irradiation and mechanical properties, and evaluating structural integrity and overall mechanical performance of the composite under extreme radiation conditions. The irradiation response will be tested using ion accelerator facilities at Texas A&M University. Defect and structural characterization before and after irradiation will be carried out using transmission electron microscopy (TEM), scanning electron microscopy (SEM), and x-ray diffraction (XRD).

**SECTION C. Environmental Aspects / Potential Sources of Impact**

Chemical Use/Storage / Chemical Waste Disposal /Hazardous Waste Generation – Research will employ small (liter) quantities of chemicals classically used in TEM, SEM, and XRD techniques. Examples of chemicals include solvents (acetone, methanol, etc.) and acids (nitric, hydrochloric, etc.). The disposal of these used chemicals will be managed through UNL’s Department of Environmental, Health and Safety in accordance with State and Federal hazardous waste regulations.

**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 composite materials 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