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RESEARCH ABSTRACT FORM

TITLE: Advanced fuel matrix design for next generation reactors

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The advanced design fuel matrix plays a dominant role in diminishing nuclear proliferation risks and waste degradation that stems from radioactive decay of long-lived transuranics, while increasing burn-up at for the next generation reactors. The fuel matrix will be created using the knowledge and experimental data from current fuels, which will provide detailed information on the fabrication, performance, and properties of the design. To determine the neutronics of the advanced fuel matrix, a shielding and criticality examination must be conducted by modeling the neutron source, shield and detector. The shielding examination will yield the neutron flux in the region of space occupied by the detector while the criticality examination determines the K-effective for the new fuel. Based on the flux found in the detector, the shield thickness or the source strength can be optimized. If the flux in the detector is found to be optimal then there are greater chances that the transuranics could become depleted during the fuel cycle while providing efficient energy for the next generation reactors as a result.