Development of a High Throughput Nuclear Materials Synthesis Laboratory

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ABSTRACT:

Nuclear materials discovery and qualification has been plagued with long-lead times and immense expense over the past several decades. These deficiencies have contributed towards the delay in promoting advanced nuclear power plants to the forefront of the energy landscape in the United States. To increase the pace of innovation, new facilities and research directions are needed that target high throughput nuclear materials science. Over the past several years, the nuclear energy supporting universities have developed and bolstered their high-throughput radiation effects testing and characterization, including the University of Michigan. But, little attention has been taken to develop high throughput material synthesis capabilities. This work seeks equipment to establish rapid materials consolidation and modification to complement the already established facilities at the University of Michigan including the world-class Michigan Ion Beam Laboratory (MIBL). Coupling both MIBL and the proposed facility in a single research effort means a new end-to-end high throughput nuclear materials discovery capability in a single institution. This end-to-end solution will not be exclusive to investigators at the University of Michigan. MIBL has been open to external user access via the Nuclear Science User Facilities (NSUF) since 2009. The new synthesis capabilities will be made available to these users via standard collaboration platforms. The resulting increase in capability at the University of Michigan will thus serve all nuclear energy supporting universities, national laboratories, and industry.