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**The Impact of Process Modeling and Characterization on the  
Fabrication of MP-1 and Future Experiments**

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**ABSTRACT**

The National Nuclear Security Administration's Material Management and Minimization Office is continuing to demonstrate the fabrication capability of an acceptable low-enriched uranium nuclear fuel for the conversion of U.S. research reactors from highly-enriched uranium to low-enriched uranium. The fuel is a low-enriched uranium - 10 weight percent molybdenum (U-10Mo) alloy. Manufacturing the U-10Mo alloy consists of multiple complex thermomechanical processes and getting a consistent product that meets specifications is of prime importance. The process modeling and the characterization activities have served as an important tool that the project utilizes to address the fabrication challenges and to better understand the evolution of microstructure as a function of thermomechanical processing. These activities not only address the aforementioned goals, but also provides insight to processing "windows" (parameter ranges) beyond the nominal parameters used to fabricate the fuel. The current work describes the impact of process modeling on the MP-1 experiment and how the microstructure evolved as a function of thermomechanical processing and how this can be applied to future fabrication campaigns and irradiation experiments.