Corresponding Author

Benjamin Beeler

Idaho National Laboratory

2525 Fremont Ave

Idaho Falls, ID 83402

208.526.2125

Benjamin.beeler@inl.gov

Dear Editorial Board,

Journal of Nuclear Materials

On behalf of my co-authors and myself, I am hereby submitting our manuscript, entitled ``*Calculation of the displacement energy of alpha and gamma uranium*”, for publication in the *Journal of Nuclear Materials*. This article provides the first investigations on the displacement energy in metallic uranium. There have been no experimental studies, nor have there been previous computational studies, into this subject.

As both U-Mo and U-Zr fuels have enjoyed strengthened interest due to their applicability as research reactor and fast reactor fuel, respectively, and that both of the fuel systems are uranium rich (greater than 75 atomic percent uranium), fundamental radiation damage studies on metallic uranium are of critical importance. This manuscript calculates the displacement energy in metallic uranium as a function of temperature. In addition, this manuscript compares the alpha and the gamma phases of uranium, providing insight into the different fundamental response to radiation of the different phases, each of which exhibit different radiation damage and swelling behaviors.

Finally, this manuscript utilizes and compares three unique interatomic potentials. Comparatively few interatomic potentials have been constructed for metallic uranium systems, particularly when compared to UO2. Thus, understanding how the utilization of various potentials will affect the results of one’s study is a crucial aspect of producing usable, verifiable computational data.

This work can be utilized by experimentalists to compare sample irradiation dose and by higher length scale modelers as input into meso- and macro-scale modeling methodologies.

There are no previous or concurrent submissions related to this work.

Sincerely,

Benjamin Beeler