MAS17-2017-000014
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Abstract for an Invited Paper
for the MAS17 Meeting of
the American Physical Society

Radioisotopes And Nuclear Isomers: Reaching Beyond Chemical Energy Storage For Energy And Power Applications

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Energy storage in chemicals, whether fuels or batteries, forms the basis for the Army's many energy and power applications. However, these materials are limited in both energy density ($\sim 10^4$ J/g) and practical longevity (a few years for batteries). There is considerable interest in moving beyond these limitations - at the extreme, fissionable materials reach about 10^{11} J/g intrinsic energy density, but nuclear reactors are not attractive for portable energy storage. For this reason, research has focused on radioisotopes and nuclear isomers (metastable excited nuclear states) as a means of pushing beyond the "chemical barrier" to reach greater energy densities and longer energy storage times. This presentation will survey basic research conducted by the Army Research Laboratory and collaborating institutions in national laboratories and academia aimed at determining the feasibility of radioisotopes and nuclear isomers for energy and power applications.