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**Characterizations of the LEU UMo powders used in EMPIRE irradiation
experiment**

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ABSTRACT

To reduce nuclear proliferation risks, substantial efforts are conducted to develop low ²³⁵U enriched fuels, aiming to convert research reactors cores. HERACLES is the European consortium that supports UMo LEU fuels for the conversion of European HPRR. HERACLES and US-DOE are working jointly to produce UMo LEU dispersed mini-plates to be irradiated in the EMPIRE experiment. Those plates have been produced and transported to INL. The irradiation is scheduled in ATR reactor (US) in 2018.

Within EMPIRE, the influence of (i) UMo chemical composition homogenization by heat treatment, (ii) ZrN coating by PVD and ALD processes will be tested.

The aim of this work is to understand the properties of UMo particles before irradiation (grain size, Mo distribution...) in relation with coating features (oxidation, composition, thickness...). To support the powder characterizations, measurements have been performed using SEM, EDX, EPMA and TEM technics. It allows to have a reference state for the study of UMo particles behavior under irradiation.