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ONE-STEP METHOD TO SYNTHESIZE TUNGSTEN NANOFLUIDS IN VARIABLE GRAVITY

Abstract

The objective of this research is to synthesize high heat capacity tungsten nanofluids in low gravity conditions where gravity driven convection is suppressed. Nanofluids are suspensions of nanoparticles in various base fluids. The suppression of gravity driven convection is predicted to give rise to homogeneous atomic species being more efficiently ablated into a working fluid. Due to the fact that tungsten has a large heat capacity and thermal conductivity, tungsten nano or atomic particles will significantly increase the heat conductivity of the base fluid. This research will examine, for the first time ever, the one-step process of synthesizing tungsten nanofluids or possibly pure ionic liquids in microgravity. This entails the ablation of tungsten into various base fluids. The one-step synthesis and characterization of this fluid with respect to thermal properties will be critically examined. The effect of microgravity on the size of the particles produced and the stability of the nanofluids will be investigated. Synthesis will take place in 1g conditions at ZARM, in low gravity conditions at the Drop Tower Bremen (drop mode, 4.74 s), and in parabolic flight conditions (ca. 22s).