Comparison of Thermophysical Properties of Ni-Based Superalloys Using Electrostatic Levitation

Brandon Phillips[1, S, C], Michael Sansoucie[2], Jannatun Nawer[3] and Douglas Matson[3]

[1]*EM31 Materials Science Team, Electrostatic Levitator Lab, NASA Marshall Space Flight Center, Huntsville, AL, U.S.A.*
[2]*EM30 Materials Science, NASA Marshall Space Flight Center, Huntsville, AL, U.S.A.*
[3]*Mechanical Engineering Department, Tufts University, Medford, MA, U.S.A.*
brandon.s.phillips@nasa.gov

Using electrostatic levitation processing tools and modeling capabilities, we are exploring the sensitivity gains by comparing brand and batch Ni-based industrial superalloys. Ni-based superalloys, such as Inconel 625 and 718, have many high-performance applications, including turbine blades for aerospace engines. Superalloy parts are typically manufactured by casting, forging, or additive manufacturing. Accurate models of these processes require thermophysical properties, such as density, surface tension, and viscosity. Using the ground-based electrostatic levitation facilities at NASA Marshall Space Flight Center, we will compare the thermophysical properties of Inconel 625 and 718.