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**Thermo-Rheometric Studies of New Class Ionic Liquid Lubricants** SAYAVUR BAKHTIYAROV, New Mexico Institute of Mining and Technology, KENNETH STREET, DANIEL SCHEIMAN, NASA GRC, ALAN VAN DYKE, Case Western Reserve University — Due to their specific properties, such as small volatility, nonflammability, extreme thermal stability, low melting point, wide liquid range, and good miscibility with organic materials, ionic liquids attracted particular interest in various industrial processes. Recently, the unique properties of ionic liquids caught the attention of space tribologists. The traditional lubricating materials used in space have limited lifetimes in vacuum due to the catalytic degradation on metal surfaces, high vaporization at high temperatures, dewetting, and other disadvantages. The lubricants for the space applications must have vacuum stability, high viscosity index, low creep tendency, good elastohydrodynamic and boundary lubrication properties, radiation atomic oxygen resistance, optical or infrared transparency. Unfortunately, the properties such as heat flow, heat capacity, thermogravimetric weight loss, and non-linearity in the rheological behavior of the lubricants are not studied well for newly developed systems. These properties are crucial to analyzing thermodynamic and energy dissipative aspects of the lubrication process. In this paper we will present the rheological and heat and mass transfer measurements for the ionic liquid lubricants, their mixtures with and without additive.

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