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Conditioning of In-Situ Propellants for RMF-FRC Plasma Thrusters MICHAEL HOLMES, U.S. Air Force Research Laboratory, Edwards AFB, CA, 935524, USA, CARRIE HILL, NOLAN UCHIZONO, ERC Inc., Edwards AFB, CA, 935524, USA — Current ion thrusters use noble gases to limit chemical attack of thruster components. However, thrusters based on Field Reversed Configuration (FRC) plasmas need not directly contact propellants so that reactive propellants such as ammonia, methane, butane, water, or combination of these are possible. The practical need to convert liquid propellant to a gaseous partially ionized state is what drives our research. A decomposition device was built to transition from liquid to gas to partially ionized plasma. Pressure is maintained high enough so that all chemical components have residence times sufficiently long to complete phase change and to reach chemical equilibrium at high temperature so the gas consists of primarily of H_2O, H_2, N_2, O_2, CO, and CO_2. This gas is then fed to an inductive discharge that further breaks down molecules and brings the propellant to the proper ionization configuration for the FRC. We will be measuring chemical state, ionization state, and uniformity as propellant enters the discharge region. A parallel FRC thruster effort is underway.

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