Abstract #796

English

Mars Propellant Production Using Ionic Liquids

The use of Ionic Liquids for CO2 capture and electrolysis has several advantages that make it well-suited for in situ propellant production. These advantages can be exploited for future Mars Sample Return and human exploration missions. Ionic liquids are capable of capturing a large mole fraction of CO2 and can serve as an electrolyte for direct electrolysis of CO2 and H2O to CH4 and O2. We expect this method to be more energy efficient (~25% less energy), require fewer processing steps, and ~50% less mass, as compared to CO2 freezing/methanation/water electrolysis. We are verifying this process which would greatly reduce power, mass, and complexity through the use of a single vessel for CO2 capture and electrolysis to propellant. Electrolysis of CO2 + H2O in ionic liquids to CH4 and O2 has not been demonstrated before, although electrolysis of the gases to methane and oxygen has been performed with a copper catalyst and Nafion membranes. This presentation will report the results of a joint Kennedy Space Center (KSC), Marshall Spaceflight Center (MSFC), and Mercer University project to identify and test ILs with the correct properties (CO2 sorption capacity, low viscosity, high conductivity, and electrochemical window) and electrocatalysts.

French

No abstract title in French

No French resume

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