IAF SPACE PROPULSION SYMPOSIUM (C4)
Joint Session between IAA and IAF for Small Satellite Propulsion Systems (8-B4.5A)

Author: Ms. Amanda Steckel
MIT Lincoln Laboratory, United States, amanda.steckel@ll.mit.edu

FREEFORM PROPELLANT DELIVERY SYSTEM FOR CUBESATS

Abstract

Additive manufacturing (AM) techniques enable the construction of a freeform fuel storage tank using underutilized volume in the interior of the Cubesat. One modality of fuel storage in the absence of acceleration or gravity is surface tension of a pressurized monopropellant. This technique requires the use of a propellant management device (PMD) to constrain the fuel to the tank outlet and reject intrusion of gas bubbles from the pressurization gas. The interaction between the fuel and PMD is of critical importance to the system design, and a primary factor in this relationship is the liquid adhesion and wetting of the fuel to the PMD surface. This adhesion is a function of both the construction and condition of the materials involved. In this paper we report measurements on the adhesion of deionized water and hydrogen peroxide to AM surfaces. These measurements will be used to assess the impact of AM materials on system performance and deliverable fuel volume.

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited. This material is based upon work supported by the United States Air Force under Air Force Contract No. FA8702-15-D-0001. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the United States Air Force.