Paper ID: 38026
oral

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

Author: Mr. Nathan Orr
Deep space Industries, United States

# DEVELOPMENT OF A LAUNCH SAFE CUBESAT AND MICROSATELLITE WATER PROPULSION SYSTEM

**Abstract**

A key focus of Deep Space Industries (DSI) is the creation of technologies that both enable asteroid mining and exploit the resulting resources. In the near-term, the resource of primary interest will be water both for its abundance in C-type near-Earth asteroids and for its immediate versatility in cis-lunar space. One of the key applications of this water will be for spacecraft propellant which has motivated DSI to develop Comet, the first in a series of propulsion technologies that can be fueled by space resources. While on-orbit water refueling stations are still many years away, many of the benefits of water as a safe, non-toxic and low pressure propellant can be realized today to create a low cost yet high performance and launch safe spacecraft propulsion system. Comet is an electrothermal thruster suitable for CubeSats and Microsatellites that heats water to high temperatures in order achieve a specific impulse of 170s and thrust of 20mN with only 25W of power. Developing a compact thruster suitable for nanosatellites presented many unique challenges in regards to the thermal and mechanical design. This paper discusses these design challenges and presents the test results from the space qualification of three flight Comet thrusters produced for the HawkEye 360 constellation. Comet provides a delta-V of 100m/s to each HawkEye spacecraft to enable precise formation maintenance required to precisely triangulate radio frequency emissions from earth. As prime contractor for the HawkEye 360 mission, DSI worked closely with the launch provider to ensure the propulsion system was safe for launch, with no special personnel training or certification required. This represents one of the most significant cost savings of this technology as onerous regulatory hurdles can be avoided.