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Research and Development on Thrusters with HAN (Hydroxyl Ammonium Nitrate)  
Based Monopropellant

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<Abstract>

Propellant loading onto reaction control system(RCS) and propulsion system for launch vehicles or satellites is one of the hazardous operations on launch site because propellant like hydrazine is toxic. That is why operators must wear Self Contained Atmospheric Protective Ensemble(SCAPE) suits during loading operation.

To make this loading operation more safely and provide more efficient propulsion system to launch vehicles and satellites, JAXA has been carrying out research and development about new monopropellant composition : HAN based solution. It has lower toxicity than hydrazine, and is called as one of the “Green Propellant”. Therefore, it will not be necessary to wear SCAPE suits. Furthermore, it has approximately 10-20% higher specific impulse, 1.4 times higher density, and lower freezing point and lower toxicity than hydrazine. From these advantages, HAN based solution could be an alternative to hydrazine. On the other hand, pure HAN solution is an explosive, so it is important to use it as a mixture with other materials in order to suppress its reactivity.

In this paper, we introduce latest safety evaluation tests results such as Large scale card gap test, BAM friction test, BAM fall hammer test, material compatibility test and so on. And also introduce current research and development status of thrusters with HAN based monopropellant in JAXA.