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Author: Ms. Seonghyeon Park
Hanbat National University, Korea, Republic of, jks5880@gmail.com

Mr. Kyounghwan Lee
Hanbat National University, Korea, Republic of, hyy0029@gmail.com
Ms. Kim Chungman
Hanbat National University, Korea, Republic of, k19970414@gmail.com
Dr. Hongjae Kang
Korea Institute of Machinery & Materials, Korea, Republic of, hjkang@kimm.re.kr
Mr. Youngchul Park
Korea, Republic of, babysoo@add.re.kr
Prof. Jongkwang Lee
Hanbat National University, Korea, Republic of, jongkwang@hanbat.ac.kr

PHYSICAL PROPERTIES AND IGNITION CHARACTERISTICS OF HYPERGOLIC PROPELLANT WITH OXIDIZING ADDITIVES

Abstract

Hypergolic propellants indicate combinations of fuels and oxidizers being able to spontaneously ignite based on the physical contact without an additional ignition source. The property enhances the simplicity of the propulsion system. Conventional hypergolic propellants are the combinations of hydrazine derivatives and nitrogen tetroxide (NTO). They have been widely applied to propulsion systems of spacecraft because of their superior performance on ignition and specific impulse. Nowadays, the development of reduced or non-toxic hypergolic propellants has been actively ongoing because the toxicity and carcinogenic potential of the existing hypergolic propellants cause technical issues. Hydrogen peroxide (H2O2) at a high concentration has drawn attention as a green hypergolic oxidizer owing to its environmentally-friendly properties. However, hypergolic pairs with H2O2 has lower performance and high freezing point. In the present research, the effects of oxidizing additives on the physical properties and ignition performance of green hypergolic combinations were investigated. The hypergolic combinations consisted of ionic liquid fuels (EMIM SCN and BMIM SCN) and hydrogen peroxide containing oxidizing additives. LiNO3 and NH4NO3 were used as the oxidizing additives and dissolved in the 60 95 wt.