

Formation of Lanthanum Hexaaluminate Grains for Monopropellant Thruster Using Green Propellants

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Monopropellant thruster using green propellants such as hydroxyl amine nitrate (HAN) has been investigated extensively to substitute the present *state of art* hydrazine monopropellant thruster that requires expensive fueling and testing facilities for satellite application. However, the catalyst for green propellant based thruster should be durable at high temperature and high pressure reaction condition otherwise it loses catalytic activity due to the phase transition from γ - Al_2O_3 and α - Al_2O_3 with significant decrease of active surface area. In this work, the self-sustaining lanthanum hexaaluminate grains of 14–18 mesh was prepared starting from the γ - Al_2O_3 granule with the incorporation of rare earth metal ions. The La doped γ - Al_2O_3 was converted into the lanthanum hexaaluminate crystals referred from the result of X-ray diffraction. The obtained hexaaluminate grains of La/Al=2/24 contained the surface area of $14 \text{ m}^2\text{g}^{-1}$ at 1673 K. Most importantly, the crushing strength was found to be 10 to 14 N for all grains independent of heating temperature.