Hypergolic ammonium ionic liquids for chemical propulsion

김중현, 조성준*, 이현정, 정하나
전남대학교
(sjcho@jnu.ac.kr*)

Hydrazine and hydrazine derivatives have been used as standard propellants in controlling satellite's altitude and attitude. However, it has been considered as highly toxic of high LD50 and it is also sensitive to adiabatic compression due to a high vapor pressure. In order to overcome these problems, a new eco-friendly chemical propellant has to be developed. Highly energetic ionic liquid can be a promising alternative because of its low vapor pressure. Dicyanamide anion based diquaternary ammonium ionic liquids, 1,1'-(propane-1,3-diyl)bis(1-methylpyrrolidin-1-ium) and hexamethylethane-1,2-diaminium were synthesized following the simple quaternization reaction and ion exchange method. Ignition delay of tetramethylethylenediamine and these diquaternary ionic liquids have been measured using concentrated nitric acid as an oxidant. The obtained ionic liquids were characterized using 13C and 1H NMR spectroscopy. The chemical and thermodynamic properties were also evaluated using both semi-empirical and ab-initio calculations, respectively.