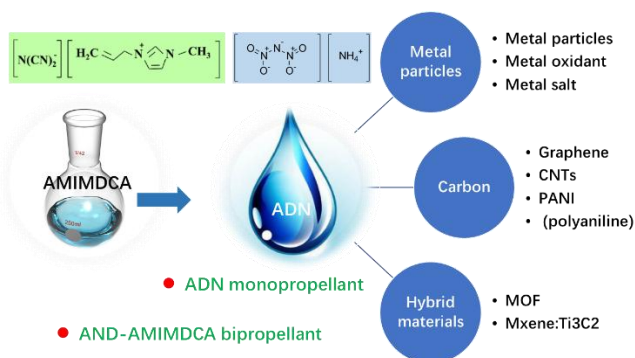


Microwave controlled ignition, combustion and associated characteristics of ADN-based energetic ionic liquid propellant

Ruiqi Shen, rqshen@njust.edu.cn, professor, head of Micro-nano Energetic Devices Key Laboratory of MIIT, director of Institute of Space Propulsion of NUST
School of Chemistry and Chemical Engineering, Nanjing University of Science and Technology, 200
Xiaonglingwei Street, Nanjing 210094, Jiangsu Province, China

ABSTRACT

ADN is an important ionic green oxidant widely used in mono-/bin-chemical propulsion, and in solid propellant. Because of ionic properties, ADN has a good ability to absorb microwave. In the development of microwave thruster, ADN based ionic liquid propellant is selected as energetic propellant of microwave thruster. In order to know its electrical properties, microwave sensitivity, microwave ignition and combustion, and also the functions of additive materials to enhance the microwave effects, all of above contents are researched and the researched



results will be presented in the presentation. Although ADN is an energetic oxidant in ionic liquid, but it is not able to ignited by microwave independently. If ADN ionic liquid mixed by other ionic fuel, such as AMIMDCA, and nano particles (nAl, nTi, nNi and nCu) and their MOF materials, ADN based ionic liquid not only is ignited by microwave,

but also these additives are able to enhance ignition and combustion. ADN based ionic liquid propellant has a good controllable performance that operating condition (turn on/ turn off) is controllable by microwave. The characteristic is very important for space propulsion. In the presentation, we will know the characteristics and performances of microwave ignition and combustion of ADN based liquid propellant.



Ruiqi SHEN

Professor of School of Chemistry and Chemical Engineering, Nanjing University of Science and Technology; head of the Micro-nano Energetic Devices Key Laboratory of Ministry of Industry and Information Technology (MIIT); director of the Institute of Space Propulsion (ISP) of Nanjing University of Science and Technology.

Education experiences: BA degree of East China Institute of Technology in 1983; MS degree of East China Institute of Technology in 1986; PhD degree of Nanjing University of Science and Technology in 1991.

Professional affiliations: committee member of the professional board of Electric Propulsion of Chinese Society of Astronautics (CSA); committee member of the professional board of Return and Reentry of CSA; vice-

chairmen of pyrotechnics committee board of China Ordnance Society (COS); chief scientist of the Chinese-Belarus Science Laboratory on Vacuum Plasma Physics; honorary doctor degree of the Institute of Combustion Problems (ICP), Ministry of Education & Science of the Republic of Kazakhstan in 2019

Research interesting: chemical propulsion, space propulsion, energetic materials, pyrotechnics, Pyro-MEMS, laser chemistry and physics, nano materials and nano technology.