

Opportunity Title: Cryogenic Chemistry Studies of Water Ice Mixtures Germane to Outer Planet Satellites

Opportunity Reference Code: 0051-NPP-NOV23-JPL-PlanetSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0051-NPP-NOV23-JPL-PlanetSci

Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description The Voyager, Galileo and Cassini missions have provided an amazing yield of scientific results. Among these are new, strange and even bizarre observations of the icy bodies that exist in the outer solar system (e.g. global sub-ice oceans on Europa, geysers that eject water and carbon-bearing compounds into space on Enceladus, surfaces stained by sulfur and its chemical reaction products and nitrogen materials that may be distributed between Titan and Rhea at Saturn). We are examining photochemical reaction processes with step-wise variable control of wavelength in order to understand and unravel the nature of the processes active on these bodies and to understand the physical aspects of the water ice surfaces that respond to solar photons and thermal cycling. These very precise, definitive laboratory data will be used to compare laboratory signatures with spacecraft observations – hopefully elucidating materials present and processes responsible for their existence. Opportunities exist to work in the laboratory with unique, state-of-the-art investigative equipment that prepares and follows the physical processes and chemical reactions in highly characterized doped water ice layers by utilizing optical spectroscopy and mass spectrometry.

References: 1. R. Hodyss, P. V. Johnson, G. E. Orzechowska, and I. Kanik, Carbon dioxide segregation in mixed CO₂:H₂O ices, *Icarus* (2007), doi:10.1016/j.icarus.2007.10.005 2. G. E. Orzechowska, J. D. Goguen, P. V. Johnson, A. Tsapin, and I. Kanik Ultraviolet Photolysis of Amino Acids in a 100K Water Ice Matrix: Application to the Outer Solar System Bodies, *Icarus* , 187, 584-591 (2007).

Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science: Planetary Science

Advisors:

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Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: <https://www.nasa.gov/oiir/export-control>.

Eligibility is currently open to:



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- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.