

**Opportunity Title:** Experimental Studies of Planetary Accretion, Differentiation, and Magmatism

**Opportunity Reference Code:** 0001-NPP-NOV23-JSC-PlanetSci

**Organization** National Aeronautics and Space Administration (NASA)

**Reference Code** 0001-NPP-NOV23-JSC-PlanetSci

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

**Description** The origin and evolution of planetary interiors, though remote from us both temporally and spatially, can be elucidated through high-pressure and temperature laboratory experiments. This research is conducted in Johnson's high-pressure experimental petrology facility, which features hydraulic presses fitted with multiple anvil and piston cylinder devices that can achieve high pressures (0.1 to 25.0 GPa) and high temperatures (up to 2,500 C) in relatively large sample volumes. This capability allows the laboratory observation of mineral and magma properties at conditions equivalent to a depth of 700 km in the Earth and Venus, 2,000 km in Mars, and pressures exceeding the Moon's central core at 1,700 km. Current research includes studies of the physics and chemistry of accretion and core formation in Earth and its Moon, Mars, and asteroids; the timing of differentiation of terrestrial planets; the geochemistry of the platinum group elements; and the nature of planetary basaltic magmatism.

#### References

Righter, K., Pando, K., Marin, N., Ross, D. K., Righter, M., Danielson, L., Lapen, T. J. and Lee, C. (2018), Volatile element signatures in the mantles of Earth, Moon, and Mars: Core formation fingerprints from Bi, Cd, In, and Sn. *Meteorit Planet Sci*, 53: 284-305.

Righter, K., Go, M., Pando, K., Danielson, L.R., Ross, D.K., Rahman, Z., and Keller, L.P. (2017) Experiments on lunar core compositions: Phase equilibrium analysis of a multicomponent (Fe-Ni-S-C) system. *Earth Planet. Sci. Lett.* 463, 323-332.

Righter, K., Sutton, S.R., Danielson, L.R., Pando, K.A., and Newville, M. (2016) Redox Variation in the Inner Solar System with New Constraints from Vanadium XANES in Spinel. *American Mineralogist* 101, 1928-1942.

#### Location:

Johnson Space Center  
Houston, Texas

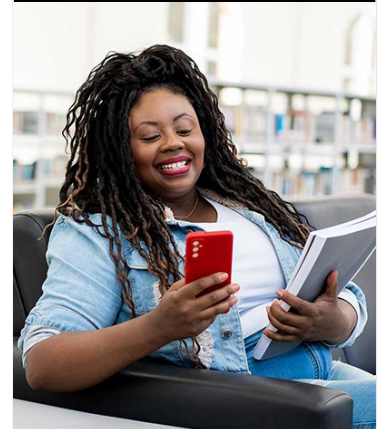
**Field of Science:** Planetary Science

#### Advisors:

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Eligibility is currently open to:

- U.S. Citizens;



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- 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.