Opportunity Title: Infrared Detector Technology Development
Opportunity Reference Code: 0201-NPP-MAR26-JPL-EarthSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0201-NPP-MAR26-JPL-EarthSci

How to Apply All applications must be submitted in Zintellect

Please visit the NASA Postdoctoral Program website for application instructions and requirements: How to Apply | NASA Postdoctoral Program (orau.org)

A complete application to the NASA Postdoctoral Program includes:

1. Research proposal
2. Three letters of recommendation
3. Official doctoral transcript documents

Application Deadline 3/1/2026 6:00:59 PM Eastern Time Zone

Description **About the NASA Postdoctoral Program**

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed to advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology.

Description:

Sensor systems based on high performance infrared (IR) detectors have made significant contributions to NASA's Earth Science (e.g., observables related to Surface, Biology, and Geology) and Planetary Science missions (Io Observer, Lunar, Uranus), and to science in general. IR detectors are ubiquitous to almost all areas of measurement, and detector arrays flown on space missions have provided exquisite visual and scientific images, instrumental in advancing our understanding of our home planet and the universe around us. Our goal is to pursue the development of emerging detector technologies which promise extensions in sensitivity, resolution, array size and other figures of merit relevant to the full set of NASA Quests, while simultaneously decreasing their size, weight and power requirements (SWAP) so critical for space missions, as well as their cost.

Large detector arrays in the visible and near IR have been developed that come close to the physical limits in terms of quantum efficiency (QE) and dark current. Future work on detector materials will extend this performance into the long-wavelength IR (LWIR). Artificially fabricated heterostructures are providing improved performance over bulk LWIR materials, and further work is needed to fully exploit this approach for high QE and low noise in large LWIR arrays. Significant enhancement is also possible in the design and fabrication of digital read out integrated circuits (DROICs) for space instruments that affect focal plane array (FPA) signal to noise, dynamic range, and speed. Novel in-pixel DROIC architectures avoid signal saturation when imaging high-dynamic-range sources and minimize instrument SWAP. Other key advances important to pursue in FPA design are the development of novel approaches to achieve single photon counting, such as Avalanche Photodiaodes (APDs) in mid- and long-wavelengths. The integration of nanostructured flat lens technology and other metasurfaced components such as filters and polarizers into FPAs is also an important area to increase

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performance and reduce SWAP.

Research objectives may include:

1. Perform trade study to determine the best approach for the detector using advancements such as III-V heterostructure engineering
2. Determine key metrics for success such as spectral range, SNR, operating temperature, pixel uniformity, operability, etc.
3. Develop the necessary analysis and simulation to justify that the proposed approach has a reasonable chance of meeting the key metrics
4. Develop and demonstrate proposed approach that is consistent with the analysis/simulation results. This include test detectors
5. Analyze how environmental variables such as vibration, radiation environment, etc. may limit the usefulness of these IR detector in space environments

David Z. Ting, Alexander Soibel, Arezou Khoshakhlagh, Sir B. Rafol, Sam A. Keo, Linda Höglund, Anita M. Fisher, Edward M. Luong, and Sarath D. Gunapala, "Mid-wavelength high operating temperature barrier infrared detector and focal plane array", Appl. Phys. Lett. 113, 021101 (2018); https://doi.org/10.1063/1.5033338

Shuyan Zhang, Alexander Soibel, Sam A. Keo, Daniel Wilson, Sir. B. Rafol, David Z. Ting, Alan She, Sarath D. Gunapala, and Federico Capasso, "Solid-immersion metalenses for infrared focal plane arrays", Appl. Phys. Lett. 113, 111104 (2018); https://doi.org/10.1063/1.5040395.

Location:
Jet Propulsion Laboratory
Pasadena, California

Field of Science: Earth Science

Advisors:
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sarath.d.gunapala@jpl.nasa.gov

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.

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Eligibility is currently open to:

- 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

This opportunity may require the following: 1- Mandatory drug testing; 2-Random drug testing; 3- Testing prior to initiation of fellowship appointment.

Questions about this opportunity? Please email npp@orau.org

Point of Contact Mikeala

Eligibility Requirements

- **Degree:** Doctoral Degree.