zintellect
climb higher

Opportunity Title: Solid State Laser Materials Development
Opportunity Reference Code: 0018-NPP-MAR23-LRC-EarthSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0018-NPP-MAR23-LRC-EarthSci

Application Deadline 3/1/2023 6:00:00 PM Eastern Time Zone

Description The Laser Materials Development research group in the Laser Remote Sensing Branch (LRSB), Engineering Directorate (ED) at NASA Langley Research Center conducts research focused on laser materials, spectroscopy and laser engineering in areas relevant to NASA's earth science mission. The work encompasses theoretical models, fundamental science research, and laser engineering of devices, using a combination of modeling, experiment and laser design. This is an ongoing state-of-the-art endeavor to research and design new materials that meet new objectives in line with NASA's interests. The three tiers of work can be summarized as follows:

1.) Modeling: Ab initio quantum mechanical design and evaluation of laser materials (e.g., energy levels, energy transfer parameters, and transition probabilities) in addition to simulation of solid state oscillators and amplifiers to predict, evaluate and improve laser performance.

2.) Spectroscopy: Development of solid state laser materials, specialized in spectroscopy of rare earth ions in solids (absorption, emission, quantum efficiency, energy transfer, energy levels, Judd-Ofelt theory).

3.) Engineering: Solid state lasers (Resonator design, flashlamp pumping, diode pumping, Q-switching, non-linear frequency conversion).

Some examples of work include laser materials such as Tm:Ho:YLF and Tm:Ho:LuLF for 2.0-μm applications, Er:Tm:Ho:YAG and Er:Tm:Ho:LuAG for dual wavelength medical applications at 2.1 μm and 2.9-μm, Nd-doped compositionally tuned mixed garnets for laser applications around 0.94 μm, Tm-doped glasses for fiber laser applications, multi-wavelength Nd:YAG for frequency mixing and second harmonic generation for UV applications, Er:YAG and LuAG lasers at 1.6 μm and 2.7 to 2.9 μm for a variety of applications, quantum dot laser materials for thermometry, and mid infrared (MIR) laser materials in the 3 – 10 μm region. MIR lasers using low phonon materials presents certain challenges, but the potential of a variety of lasers beyond 3 μm is an appealing prospect being pursued.

Location:
Langley Research Center
Hampton, Virginia

Field of Science: Earth Science

Advisors:
Brian Walsh
brian.m.walsh@nasa.gov
757-864-7112

Opportunity Title: Solid State Laser Materials Development
Opportunity Reference Code: 0018-NPP-MAR23-LRC-EarthSci

Eligibility Requirements	• **Citizenship:** LPR or U.S. Citizen • **Degree:** Doctoral Degree.