RYI8-23

DAGSI Research Topic

1. **Research Title:** Novel materials and devices for nonlinear frequency conversion
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level**

   Physics, Applied Physics, Electrical Engineering (ECE), Optics, Electro-optics (working toward MS or PhD)

4. **Objectives:** Demonstration and characterization of novel nonlinear materials and devices for incorporation into midwave and longwave infrared laser-based sources.
5. **Description:** Lasers are increasingly in demand for military and civilian applications. The mid- and longwave infrared spectral regions have been difficult to access since few lasers operate at these wavelengths, and those that do have significant limitations. Nonlinear frequency conversion provides a versatile alternative for generating coherent radiation in these spectral regions. The inherent tunability of nonlinear devices offers the added benefit of much broader spectral coverage than direct laser sources. Advances over the past decade in the development of orientation-patterned (OP) semiconductor materials make it possible to engineer a device to access any spectral range within a material's transparency, using quasi-phasematching techniques. This project focuses on characterization of OP nonlinear materials, and development of frequency conversion devices based on them. Material parameters of interest include absorption/scatter, nonlinearity, refractive index and dn/dT, and damage threshold. On the device side, power-scaling is the main goal, through a combination of improved material processing techniques and device design. A secondary goal is achieving broad tunability through fast, non-mechanical means without sacrificing efficiency or output power.
6. **Research Classification/Restrictions:** unclassified, restricted to U.S. Citizens
7. **Eligible Research Institutions:** Wright State University, University of Dayton, AFIT

NOTE: Topics submitted to DAGSI must be approved for public release. Need PA Approval #