

1. **Research Title:** Phosphate oxide based glasses as UV emitter hosts
2. **Individual Sponsor:**

AFRL/RXA
Attn: Dr. Jonathan Goldstein
2179 12th St., B652/R122
WPAFB, OH 45433-7718
Jonathan.Goldstein@us.af.mil
937 255 9785

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

Materials Science, Materials Engineering, Chemistry, Chemical Engineering, Physics, or Electrical Engineering, learning towards an MS or a PhD.

4. **Objectives:** Explore photoluminescence efficiencies of different activator and sensitizer concentrations, as a function of glass composition.

5. **Description:**

Phosphate glass has long been a favored host for high power lasers. Two of its unique qualities are its resistance to photodarkening, and its extremely high transmission in the ultraviolet (UV). However, it has never been exploited in a UV fiber laser. Recently there has been a spate of activity reported in the literature of various groups around the world, attempting the UV lasing of Gadolinium in a glassy medium. However, none of these groups used phosphate glass as the medium, and none of them utilized a sensitizer atom to assist with the lasing process – even though a sensitizer is clearly indicated given the very low degeneracy of the Gadolinium ground state.

In our lab we routinely make oxide glasses, and have already replicated the synthesis of very-high UV transmission Phosphate glass. The remaining work in the project will involve mixing the chemicals to prepare doped glasses, their synthesis (including working with molten glass), and their characterization. This is an opportunity to learn, and to put into practice, glass chemistry and laser theory – two of the most fascinating and ubiquitous aspects of our material reality.

6. **Research Classification/Restrictions:** US Citizenship is a requirement.
7. **Eligible Research Institutions:** DAGSI and AFIT.

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