

AFRL RESEARCH TOPIC CALL FOR FY13

1. **Research Title:** Organic photoconductor for nonlinear optics applications
2. **Individual Sponsor:**
Dr. Thomas M. Cooper, AFRL/RXAP
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3. **Academic Area/Field and Education Level:** Chemistry, Chemical Engineering, Polymer Science and Engineering, Materials Science(BA/BS, MS or Ph.D. level)
4. **Objectives:** To develop new nonlinear optical materials, the nonlinear optical properties of organic photoconductors will be explored. A series of polymer composites composed of charge-generating materials and hole-transporting materials will be prepared. Photoinduced electron-hole pair generation and migration will be examined by ultrafast time-resolved spectroscopy and measurement of nonlinear refraction. Good candidates will be characterized with optical test bed measurements to demonstrate enhanced sensor protection capability.
5. **Description:** Photoconductive polymers are insulating in the dark and become conductive upon illumination. Upon illumination, photoconducting polymers form electron-hole pairs, followed by recombination to the ground state. In conjunction with novel device design, the electron-hole pairs will have novel optical properties and exploitable energy-transduction mechanism. From our previous work in solid state nonlinear absorber fabrication, we have expertise in polymer chemistry and chromophore synthesis that can be applied to this area. We also have expertise in linear and ultrafast spectroscopy that will be used to characterize these materials. ...
6. **Research Classification/Restrictions:** This research is unclassified with the goal of publication in the open literature, however the general research area is Distribution D.
7. **Eligible Research Institutions:** Place an X in all that apply.
 X Universities (DAGSI) AFIT (only) USAFA
8. **Interest in Summer USAFA Cadet (Avg Cost for USAF Cadet for 33 days was \$5000):**
If you are submitting a topic for the USAFA, please indicate if you are also interested in sponsoring a USAF Cadet in summer of 2013