RX19-12

Polymer Templated Liquid Crystals

1. **Research Title:** Polymer Templated Liquid Crystals
2. **Individual Sponsor:**

Dr. Michael E. McConney, AFRL/RXAP
AFRL/RXA Building 652 Room 122
2179 12th Street
WPAFB, OH 45433-7718
michael.mcconney.1@us.af.mil

3. **Academic Area/Field and Education Level:**
Physics, Electro-optics, materials science, chemical engineering, electrical engineering (BA/BS, MS or PhD level)

4. **Objectives:** The objectives of the project are to better understand unique optical responses seen in polymer stabilized liquid crystals

5. **Description:** Polymer stabilized liquid crystals are liquid crystals whose properties are altered through the addition of a fraction of polymers. In the preparation of the polymer stabilized liquid crystals, the forming polymer is templated by the orientational order of the liquid crystal, thereby acting as a smart solvent. Then through a solvent exchange the original templating liquid crystal solvent can be removed and a new liquid crystal mixture can be used to re-swell the polymer. In this case the polymer can act as a smart structure and template the liquid crystal. This process of using liquid crystals to template polymers and then subsequently using the templated polymer to template liquid crystals is a powerful technique. For example a nematic-templated polymer can induce a nematic-like phase in a smectic liquid crystal. This powerful technique is still not well-explored and there are likely many new phenomena to be discovered by forcing liquid crystals into new arrangements. This project aims to explore this powerful technique to create new stimuli-responsive photonic materials.

6. **Research Classification/Restrictions:** Not Classified/Not restricted

7. **Eligible Research Institutions:** DAGSI institutions including Wright State University, University of Dayton, Kent State, Ohio State University, and University of Akron

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