

1. **Research Title:** Colloidal quantum dots for infrared and spintronic applications
2. **Individual Sponsor:**
Dr. Jonathan Goldstein, AFRL/RXEPE
AFRL/RXEPE, Building 652 Room 122
2179 12th Street
Wright-Patterson AFB, OH 45433-7718
Jonathan.Goldstein@us.af.mil
3. **Academic Area/Field and Education Level**
Materials Science and Engineering, Chemical and Materials Engineering, Mechanical and Materials Engineering, Physics, Chemistry (BA/BS, MS or PhD level)
4. **Objectives:** The overall objective of this effort is the development of colloidal quantum dots for emission in the infrared.
5. **Description:** The U.S. Air Force stands to benefit from a versatile emitter and sensor in the infrared. Various colloidal quantum dots (CQDs) hold great potential in this regard. Some have been developed and even transitioned, while others are still being explored. While modifications in the chemistry of their synthesis can lead to great improvements, details of the engineered environments in which they are used are also critical. As such, substrates designed for plasmonic and metamaterial interactions with sensors and emitters are also important. In addition, many of the key CQDs involved have been identified and elucidated as highly intriguing from the standpoint of topological materials. In addition, CQDs hold promise as amenable to implementations on flexible substrates. In AFRL we have begun both experimental and computational work in several of these directions. We are primarily interested in NRC applicants who have experience in the synthesis and characterization of CQDs, and those with experience in computation of CQD optical and electro-optical properties. However, all the different areas described above are also of great importance to the Air Force's utilization of CQDs. We will appreciate hearing from any candidate with experience in synthesis, characterization, or computation of CQD properties, who also has some strong interest or experience in any one of the areas of plasmonics, metamaterials, topological materials, spintronics, or flexible substrates.
6. **Research Classification/Restrictions:** No classified or restricted information is expected to be generated in the course of this work.
7. **Eligible Research Institutions:** Wright State University, University of Dayton, Miami U., U. of Cincinnati, The Ohio State U.