

1. **Research Title:** Low melting point liquid metal composites
2. **Individual Sponsor:**

Dr. Christopher E Tabor, AFRL/RXAS  
 2179 12<sup>th</sup> Street  
 Wright Patterson, OH 45433  
 christopher.tabor.1@us.af.mil

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

Material Science and Engineering; Chemistry; Physics; Mechanical Engineering  
 Masters or PhD candidate level

4. **Objectives:** Correlate various mechanical and electrical properties of low melting point liquid metal / elastomer composites for use in stretchable / flexible electronics, tunable mechanical hinges, and responsive substrates.
5. **Description:** Low melting point liquid metal alloys such as those based on gallium and bismuth present a new class of materials that are conductive room temperature fluids and can be utilized in responsive architectures. Several recent advances in this field have paired liquid metal with organic elastomers to generate composites that are mechanically tunable through electronic, thermal, or other stimuli by taking advantage of programmable phase transitions in the low melting point alloys. These transitions can be tuned through particle size and shape, composition, or other means and could be actuated using resistive heating, photothermal heating, or physical deformation to locally modify temperature profiles. Through navigating the solid/liquid phase boundary, intelligent control can be imparted over these composites for applications related to soft robotics, stretchable electronics, or acoustic metamaterials.
6. **Research Classification/Restrictions:** The work to be carried out under this effort is unclassified and not restricted.
7. **Eligible Research Institutions:** Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati



**DAGSI** (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati) NOTE: Topics submitted to DAGSI must be approved for public release. Need PA Approval #



**AFIT (only)**



**USAFA (only)**

If you are submitting a topic for the USAFA, indicate if you are also interested in sponsoring a USAF Cadet in summer 2019 (Average cost for USAF Cadet for 33 days is \$5000)

Yes

No