

Attachment 1 – Research Topic Template

1. **Research Title:** Predicting Solution Strengthening in FCC Ni Alloys
2. **Individual Sponsor:**

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

Materials Science, Physics, Computer Science (MS, PhD level)

4. **Objectives:** Predict solution strengthening in FCC Ni for high concentrations of solutes, as realized in commercial Ni-based superalloys.
5. **Description:** Solution strengthening of the matrix phase in Ni based superalloys is an important component of the overall flow response of these alloys at high temperature. Recent work suggests that this solution hardening can be predicted by using a combination of first principles methods and advances to traditional solution strengthening theory (see Leyson and Curtin). In this work solute – dislocation interactions will be calculated directly using a Lattice Greens Function method. The results will be used to predict strengthening for a wide range of solutes realized in commercial superalloys.
6. **Research Classification/Restrictions:** This research topic is basic research and will be published in the open literature.
7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided

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 2015 (Average cost for USAF Cadet for 33 days is \$5000)