

AFRL CALL FOR RESEARCH

1. **Research Title:** Biological Interaction of Engineered Nanomaterials
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Chemical, Biological Sciences and/or Materials Engineering (MS or Ph.D. level)
4. **Objectives:** Specific investigation objectives include:
 - Characterize nanomaterials in biological system. Determine their uptake and translocation into various parts of cells
 - Study the potential differences in cellular response from exposure to engineered nanoparticles of different geometric shapes
 - Identify molecular events involved in nanoparticle– membrane receptor binding, endocytosis and subsequent signaling activation.
5. **Description:** Engineered nanomaterials (NM), in the range of 1-100 nm, possess novel physical and chemical properties and are being used or have been proposed to be used in the creation of nanoscale devices. The unique quantum characteristics of nanomaterials confer novel physico-chemical properties to create electrical, optical and magnetic attributes, which are not present in the corresponding bulk materials. These nanoscale prepared materials are useful for military applications such as highly sensitive, rapid, and portable battlefield remote monitoring devices which can aid in the detection of a variety of analytes. Physical parameters of synthesized nanoparticles can affect these attributes and influence biological interactions such as uptake in cells and induction of cellular responses. However, it remains unclear how specific engineered nanomaterials with different size, structure, shape and geometries interact with cells, their components, or cause any molecular events involved in membrane receptor binding, general endocytosis and subsequent signaling activation. The main focus of this research is to elucidate the mechanism of nanomaterial interactions with biological systems in order to provide fundamental knowledge for the creation of molecular devices and to ensure that there are no risks associated with these materials.
6. **Research Classification/Restrictions:** *NA*
7. **Eligible Research Institutions:**

Universities (DAGSI) AFIT (only)
8. **Potential Commercial Impact and Industry Involvement:** The success of this project will lead to the development of nano-devices as sensors that will have commercial value.