

January 31st, 2014

Selection Committee  
Scholars Independent Research Fellowships  
University Scholars Program  
Northeastern University

Re: Letter of Intent

To Whom It May Concern:

My name is Scholar Generic, and I am a freshman at Northeastern University pursing a combined major in Physics and Chemical Engineering. I am very interested in expanding the fundamental knowledge of electronic devices.

I am writing to inform you that I intend to submit a full proposal to the Scholars Independent Research Fund tentatively titled "**Fabrication of high-quality  $\tau$ -phase MnAl films via molecular beam epitaxy.**" In order to create efficient devices for spintronic and magneto-electronic applications, research must focus on ferromagnetic alloys that have an easy magnetization direction perpendicular to nanometer thick films. I intend to investigate  $\tau$ -MnAl on GaAs wafers, which have a huge magnetic anisotropy giving rise to a perpendicular magnetic moment.

The overreaching goal of this research is to produce high-quality MnAl films for novel magnetic tunnel junction and spin transfer torque memory devices. I will be using molecular beam epitaxy (MBE) to deposit Mn and Al on semi-insulating GaAs wafers. Once films are grown, I will use characterization techniques to measure the magnetic properties and crystallinity of the films in order to optimize the phase of the MnAl. I will use a scanning electron microscope (SEM) for imaging the surface of the films. I will also employ a SQUID magnetometer for carrying out magnetic measurements up to 5 Tesla.

I have am completing coursework in Electricity and Magnetism and Physical Chemistry, and have worked with electronics as a hobby for many years. I have initial experience with all of the listed fabrication and characterization methods necessary to complete the research.

My mentor for the proposed project will be Prof. Ima Wizard (Department of Physics), who specializes in spintronics research and has all of the necessary equipment in her lab in Egan Research Center.

The Scholars Independent Research Fund Award will go towards supporting me during the summer while I work full time on this project.

Thanking you in advance for your consideration of my proposal, I remain at your disposal for anything I can provide to help in the review process.

Sincerely,

Scholar Generic