

Selection Committee  
Summer Scholars Independent Research Fellowships  
Office of Undergraduate Research and Fellowships  
Northeastern University

January 16, 2018  
Re: Letter of Intent

To Whom It May Concern:

My name is Husky Paws, and I am a first-year student at Northeastern University pursuing a combined major in Physics and Chemical Engineering. I am very interested in expanding the fundamental knowledge underlying electronic devices.

I am writing to inform you that I intend to submit a full proposal to the Summer Scholars Independent Research Fellowship 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 overarching 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 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 Summer Scholars Independent Research Fellowship funds will be used to support my stay in Boston while I work full-time on this project, as well as for laboratory supplies and machine time.

Thank you for considering my proposal. I remain at your disposal for anything I can provide to help in the review process.

Sincerely,  
Husky Paws