

# MSE SEMINAR

March 3, 2017  
113 McBryde Hall  
3:30 – 4:30 PM  
Refreshments at 3:00 PM

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## **“Thermomechanical properties of sensitized and corroded 5083-H116”**

### **ABSTRACT**

The US Navy currently uses 5000 series aluminum alloys in naval vessels due to their corrosion resistance, high strength, and low weight. However, once the alloys contain  $>3$  wt% Mg, they become sensitized when exposed to temperatures ranging between 50-200°C. The sensitization process allows for an anodic  $\beta$  ( $\text{Al}_2\text{Mg}_3$ ) phase to precipitate and grow along grain boundaries causing corrosion susceptibility. Different forms of corrosion damage occur depending on the orientation of exposed surfaces in seawater environments. Room temperature ultimate tensile strength and 0.2% offset yield strengths are degraded from the sensitization and corrosion processes. The effect of elevated temperature (representing fire damage) is investigated in combination with the sensitized and corrosion-damaged 5083 material. The end goal is to connect the alloy's microstructure changes with the exposure to the various damage sources (sensitization, corrosion, and fire) and to model the expected mechanical properties for various conditions.

### **BIOSKETCH**

Robert Mills pursuing his doctorate of philosophy at Virginia Tech in Materials Science and Engineering. He received his B.S. and M.S. in MSE at VT in 2011 and 2014 respectively. He is advised by Dr. Case of the Biomedical Engineering and Mechanics department at Virginia Tech. The Office of Naval Research provides funding for his projects.