

# MSE SEMINAR

April 6, 2018

113 McBryde Hall

3:30 – 4:30 PM

Refreshments at 3:00 PM

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**Graduate Student**

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## **“Improving Al-Ga Sacrificial Anodes via Simulation and Verification of Alloy Segregation”**

### **ABSTRACT**

Marine structures must deal with the corrosive effects of salt water in a way that is low cost, reliable, and environmentally friendly. Al-Ga alloys would fill this role as sacrificial anodes if their performance was consistent. The Thermo-Calc software package was used to simulate various aspects of the Al-Ga system in an attempt to understand and potentially correct this reliability issue. Simulations showed that Ga segregates to the grain boundaries during solidification and then diffuses back into the grains during cooling to room temperature, which might be the cause of the reliability issue. With this knowledge, Al-Ga alloy plates were produced with varying cooling rates and subjected to 168 hour galvanostatic testing. The performance of these plates was found to be strongly affected by cooling rate, indicating that the simulations were correct. Samples were later subjected to an annealing process to further homogenize the alloy, improving the reliability of the sacrificial anodes.

### **BIOSKETCH**

Michael Kidd is working on A Ph.D. in Material Science and Engineering, advised by Dr. Alan Druschitz. He earned his B.S. in MSE at Virginia Tech in 2012. He is currently teaching “Introduction to Thermo-Calc”, and helping the department integrate the Thermo-Calc Software package into its MSE program.