UCLA ENGINEERING
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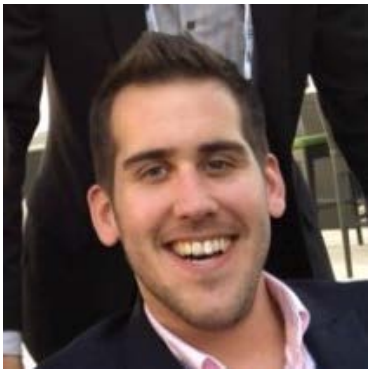
SEMINARS IN CHEMICAL AND BIOMOLECULAR ENGINEERING



Friday, May 4th, 2018 | 10:00AM **Boelter Hall 3400**

Presented by:
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University of California, Los Angeles

"Enabling Atomic Layer Etching of Magnetic and Noble Metals"

The demand for a universal memory grows each year, driven by the desire for increased storage density with better device performance. As the critical dimension of the memory nanostructures continues to shrink and new materials are introduced, additional patterning techniques and chemistries must be developed to overcome the challenges in materials processing. The ability to selectively and directionally control material removal at an atomic level allows for the further advancement of memory technologies.

My work focuses on utilizing plasma processing to control the removal and manipulate the chemical states of hard-to-etch metallic and intermetallic films such as Co, Pt and CoFeB, which are essential for magnetic memories. Sequential exposure of chlorine and hydrogen discharges were studied to enable enhanced etch rates of elemental and metal alloy thin films by up to 40% while preserving both the thin film stoichiometry and critical magnetic properties. In addition, alternating cycles of oxygen plasma in conjunction with organic vapor were investigated to facilitate etch rates down to 0.5 nm/cycle. Plasma oxidation created the necessary chemical contrast for selective material removal during the subsequent organic chemical vapor etch. Furthermore, ions present in the discharge enabled directionality in nano-scale patterning of the aforementioned hard-to-etch materials necessary for implementing next generation memories.

Altieri is a Ph.D. candidate in the Department of Chemical & Biomolecular Engineering working in the lab of Professor Jane P. Chang. He holds a bachelor of science in Chemical Engineering from Tulane University and has authored a review on plasma-surface interactions at the atomic scale and co-authored multiple publications on plasma-assisted surface modification and organic vapor processing of metal thin films to enable atomic layer etch. His graduate work focuses on plasma processing of memory devices and elucidating the interactions between processing plasmas, organic chemistries, and ferromagnetic alloys.