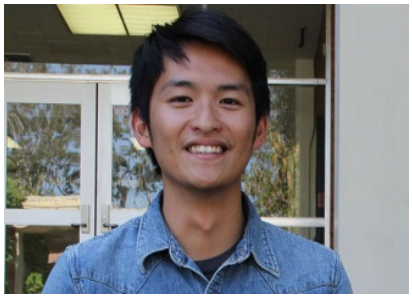
UCLA ENGINEERING
Chemical and Biomolecular Engineering

SEMINARS IN CHEMICAL AND BIOMOLECULAR ENGINEERING

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



Presented by:
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"Multiferroic Composite Oxide Heterostructures via Atomic Layer Deposition"

Multiferroic materials, which exhibit the coexistence and coupling between ferroelectricity and magnetism, are of great interest due to their potential for realizing next-generation electronics. To overcome the scarcity and weak responses of single-phase multiferroics, composite strategies were proposed to realize robust multiferroic behavior by coupling the functional properties from constituent ferroelectric and magnetic phases. For this purpose, atomic layer deposition (ALD) was employed to synthesize intimately coupled multiferroic composites at an industrial scale with its conformal and high quality growth.

Additional challenges for an applicable multiferroic composite are present in the ferroelectric phase since conventional perovskite-based ferroelectrics lack the necessary electrical stability and silicon-compatibility for device integration. The emergence of ferroelectric (FE-HfO2) based thin films in the field of microelectronics illustrates an intriguing opportunity to enable multiferroic composites that can mitigate the aforementioned challenges. Multiferroic integration with undoped FE-HfO2 thin films and ferrimagnetic CoFe2O4 (CFO) on Si substrates via radical-enhanced atomic layer deposition (RE-ALD). In this composite design, CFO acts as a mechanical constraint to stabilize FE-HfO2 as well as an active magnetic layer. With this strategy, CFO/FE-HfO2 composites showed comparable multiferroic behaviors with previously studied CFO/BiFeO3 systems, demonstrating a promising path for designing novel multiferroic composites.

Jeffrey Chang is a Ph.D. candidate from Prof. Jane P. Chang's group at UCLA chemical and biomolecular engineering department. He received his B.S. from National Taiwan University, Taiwan prior to UCLA. His research is focused on enabling multiferroic composite materials by ALD. He received the Thin Film Graduate Student Award at the 64th American Vacuum Society (AVS) Conference 2017, as well as the Best Poster Presenter Award at the 4th FAME center annual meeting. He has published multiple scientific papers including an invited research review regarding the ALD of multiferroics and plasma-surface interactions.