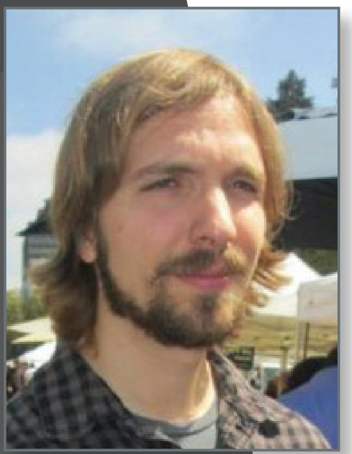
# MME SEMINAR SERIES

Everyone is encouraged to attend!

# Molecular Insights on Materials Formation from Solution




## Benjamin Legg, PhD

Postdoctoral Researcher,
Pacific Northwest National Laboratory (PNNL)


**Friday, March 8, 2019**
12:10 - 1:00 pm | BSEL 102


### Abstract

Solution-based processes provide exciting potential for materials synthesis, with applications ranging from bio-inspired composites with advanced mechanical properties, to metal-organic frameworks for chemical separations applications, to low-cost solar materials. In recent years, modern in-situ imaging tools have been used to explore the detailed mechanisms of materials growth from solution. These tools are providing new insights into 'classical' processes of crystal nucleation and growth, but they are also revealing novel pathways that involve dense-liquid precursors, complex chemical reaction networks, and nanoparticle assembly. I will provide a brief overview of these novel pathways and then share results from a recent study on crystal nucleation. Using in-situ atomic force microscopy (AFM), we have explored the nucleation of aluminum-hydroxide films at a mineral-water interface. With this technique, we are able to image single-ion adsorbates and track the formation of fluctuating molecular-scale clusters that precede crystallization. This work has allowed us to directly confirm the fundamental processes that underlie classical nucleation theories, while also demonstrating how interfaces can enhance nucleation rates by concentrating precursor ions and shifting their chemical speciation.


### Bio

Benjamin Legg is a Postdoctoral Researcher with the University of Washington. Since obtaining his PhD in Materials Science and Engineering from the University of California in Berkeley, Dr. Legg been living in Richland, Washington, where he is conducting research at the Pacific Northwest National Laboratory. Dr. Legg's research uses advanced in situ imaging methods (transmission electron microscopy and atomic force microscopy) to investigate fundamental mechanisms of materials formation in the aqueous environment. His current work focuses on mechanisms of crystal nucleation and nanoparticle assembly, with applications to the synthesis of advanced materials, and the prediction of nanostructure formation in environmental settings.

Washington State University
TRI-CITIES

**School of Mechanical and Materials Engineering**

*Interdisciplinary Excellence Built on World-Class Knowledge*