



RENEWABLE AND SUSTAINABLE ENERGY INSTITUTE

BIG energy seminar series

Addressing global energy challenges in scale and complexity.



Earth-Abundant Plasmonics

*Dr. Emilie Ringe,
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Materials Science and Metallurgy*

Date: Monday, April 8 at 1:00pm

Location: [JILA 10th floor, Foothills Room](#)

Abstract:

The colorful optical properties of gold and silver nanoparticles have been known for centuries, appearing in Roman glassware as well as medieval stained glass. The brilliant colors are the result of collective oscillations of conduction excited by light, leading to wavelength-dependent absorption and scattering. This light-matter interaction can be controlled by the size, shape, and dielectric environment of the nanoparticles, tailoring their properties to applications such as surface-enhanced spectroscopies, non-bleaching labels, hyperthermal cancer therapy, and waveguides.

Most plasmonic metals studied to date are rare: copper and silver, which oxidize rapidly, and gold, which is cost-prohibitive. This talk will briefly discuss earth-abundant aluminum nanoparticles as a plasmonic material in the UV, then report results on a new composition: magnesium. Magnesium nanoparticles are remarkably active plasmonics across the UV, Vis and NIR, as shown optically and with STEM-EELS. Surprisingly, they are stable in air for weeks owing to a self-limiting oxide layer. Colloidal magnesium has potential on its own as a plasmonic structure, and can also be used as a scaffold for additional surface chemistry, sensing, and hybrid photocatalysts.

Bio:

Dr. Ringe earned her B.A./M.S. summa cum laude in chemistry, then Ph.D. in chemistry and materials science at Northwestern University in 2012. She became the Gott Research Fellow at Trinity Hall as well as a Newton International Research Fellow (Royal Society) in the Electron Microscopy group in the Materials Science and Metallurgy Department at the University of Cambridge, UK. In 2014, she was hired as an assistant professor at Rice University, where she established the Electron Microscopy Center and received funding from the Air Force Office of Scientific Research (YIP), NSF, ACR-PRF, 3M, and the US/Israel Binational Science Foundation.

In 2018, she moved to England to take up a lectureship in multi-scale, multi-dimensional imaging of natural and synthetic materials at the University of Cambridge, joint between the Department of Materials Science and Metallurgy and the Department of Earth Sciences. She received an ERC Starting grant (1.6M Euros) to pursue her studies of Earth-abundant plasmonics. She has been elected fellow of Gonville & Caius College, is an associate member of the Royal Society of Chemistry, and serves on the editorial board of Materials Chemistry Frontiers.

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