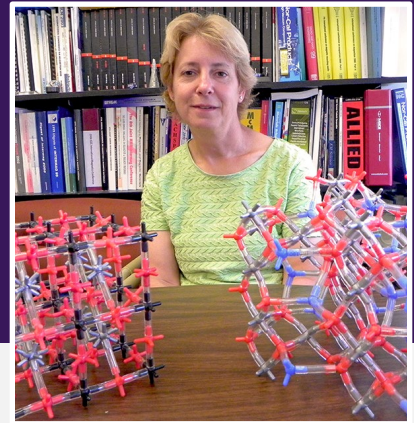


THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT  
FALL COLLOQUIUM SERIES PRESENTS:

# Caroline A. Ross

Professor and Associate Head, Materials Science & Engineering  
MIT



## *Iron garnets: enabling materials for magnonics, photonics and spintronics*

Ferromagnetic insulator thin films have emerged as an important component of magnonic, spintronic and magneto-optical devices. Yttrium iron garnet in particular is an excellent insulator with low magnetic damping, and has been incorporated into heterostructures that exhibit a plethora of spintronic and magnonic phenomena including spin pumping, spin orbit torque, spin Seebeck, proximity effects and spin wave propagation. Rare earth iron garnet films can additionally show a compensation temperature and a magnetoelastic response tunable via the composition. We use pulsed laser deposition to produce single crystal films of rare earth garnets down to a thickness of 2.5 nm, about 2 unit cells, and show that spin orbit torque from a Pt overlayer drives domain wall motion at room temperature at velocities exceeding 4 km/s. Iron garnets also exhibit magneto-optical activity and high transparency in the infrared, and we show how garnets grown on silicon can be used in integrated magneto-optical isolators to control the flow of light in photonic circuits.

**Caroline Ross** has been a professor at the Massachusetts Institute of Technology since 1997, and is the Associate Head of the Department of Materials Science and Engineering. Before joining MIT she spent six years working at Komag, Inc. in San Jose, CA on data storage materials, and two years as a Postdoctoral Fellow at Harvard University. She has a Ph.D. from Cambridge University, UK and is a Fellow of the APS, the MRS, the UK Institute of Physics and the IEEE. Her interests include thin film magnetic and multiferroic oxides and the self-assembly of block copolymers.

**Tuesday, November 10 • 4 pm CT • Zoom**

Registration is required. RSVP link is TBD.

*Questions? Contact [Kristina.lugo@northwestern.edu](mailto:Kristina.lugo@northwestern.edu).*