



Institute for Materials Science

UNCLASSIFIED

IMS Distinguished Lecturer Series



Professor Susanne Stemmer
Materials Department
University of California, Santa Barbara

Topological Heterostructures by Molecular Beam Epitaxy

Wednesday, April 25, 2018

2:00 - 3:00

MSL auditorium (TA-03 - Bldg 1698 - Room A103)

Abstract: Topology, both in real space and in reciprocal space, has emerged as a new design principle for materials that can host a wealth of novel properties. Interfaces and heterostructures with topological materials offer opportunities to control and manipulate their electronic states and associated phenomena, for example, via electric field effect, strain, or symmetry breaking. In this presentation, we will discuss recent progress in the growth of thin films of the three-dimensional Dirac semimetal Cd_3As_2 by molecular beam epitaxy. We show that high-mobility, epitaxial Cd_3As_2 films can be grown and discuss some of the phenomena that can be observed, such as an unusually large negative longitudinal magnetoresistance under parallel electric and magnetic fields. These heterostructures allow for experimental tests of theoretically predicted transitions between topological states by manipulating parameters, such as confinement and film strain. For example, as the film thickness is reduced, a band gap opens in the bulk Dirac electronic states and we observe a quantum Hall effect that is associated with surface states. If time permits, we will also discuss a different topological phenomenon, namely the realization and control of non-trivial spin textures in oxide heterostructures and how these affect the electrical transport properties, such as the Hall effect.

Bio: Susanne Stemmer is Professor of Materials at the University of California, Santa Barbara. She did her doctoral work at the Max-Planck Institute for Metals Research in Stuttgart (Germany) and received her degree from the University of Stuttgart in 1995. Following postdoctoral positions, she moved to Rice University, where she was Assistant Professor from 1999 to 2002. In 2002, she joined the University of California, Santa Barbara. Her research interests are in the development of scanning transmission electron microscopy techniques, molecular beam epitaxy, functional and strongly correlated oxide heterostructures, and topological materials. She has authored or co-authored more than 240 publications. Honors include election to Fellow of the American Ceramic Society, Fellow of the American Physical Society, Fellow of the Materials Research Society, Fellow of the Microscopy Society of America, and a Vannevar Bush Faculty Fellowship of the Department of Defense.

To be on Professor Stemmer's Agenda, to participate in the Early Career Lunch, or for general information contact
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Hosted by Alexander Balatsky * Director of the institute for Materials Science