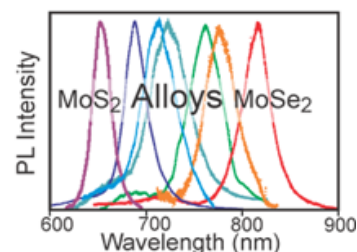
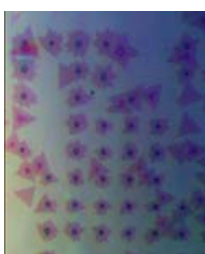
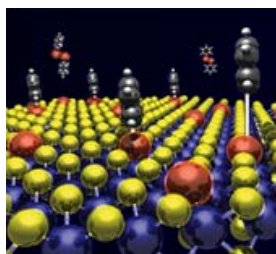


Co-sponsored with Department of Physics & Astronomy

**Dr. Ludwig Bartels**  
**University of California-Riverside**

***2D Transition Metal Dichalcogenide (MoS<sub>2</sub>, MoSe<sub>2</sub>, etc.) Films:  
 Transport, Optical Characterization, and Growth on Dielectric/  
 Ferroelectric Substrates***



Transition metal dichalcogenides (TMD) such as MoS<sub>2</sub>, MoSe<sub>2</sub>, WS<sub>2</sub>, etc. present an exciting materials system for applications from spintronics to chemical catalysis. At the single layer limit, these materials attain direct-bandgap semiconducting properties. We have optimized the growth of these materials and their alloys to form single layer films (i.e., ~6Å tall) with lateral domain sizes of ≤ 50 μm, an astonishing aspect ratio. Alloys (e.g., of MoS<sub>2</sub> and MoSe<sub>2</sub>) allow bandgap tuning/engineering. The film composition determines the photoconductivity of the single-layer material. A pronounced and extremely supralinear photoresponse is observed. The use of poled ferroelectric substrates (LiNbO<sub>3</sub>) can spatially encode the film growth on the substrate; depending on the poling orientation the transport properties and majority charge carrier of the ensuing films vary.

**Ref:** J. Mann *et al.*, *Advanced Materials* 26, 1399 (2014), Q. Ma *et al.*, *ACS Nano* 8, 4672 (1014), V. Klee *et al.* *Nano Letters*, doi: 10.1021/acs.nanolett.5b00190 (2015)

**Bio:** Ludwig Bartels received his doctorate in physics from the Free University Berlin (Germany) working with Karl-Heinz Rieder on scanning tunneling microscopy at metal surfaces. Prior to that, he earned his first degree with Karsten Horn and Alex Bradshaw on the electronic structure of metal films on GaAs. He held postdoctoral appointments with Klaus Ploog at the Paul Drude Institute for Solid State Electronics in Berlin (Germany) and with Tony F. Heinz at Columbia University in NYC. Ludwig Bartels has been Professor of Chemistry at the University of California, Riverside since 2000. Bartels' lab works on the development and characterization of molecular and, more recently, MoS<sub>2</sub> films from the atomic to the centimeter scale utilizing an array of techniques ranging from scanning tunneling microscopy at low temperatures in vacuum to photoluminescence, X-ray and Raman spectroscopy on extended CVD-grown films. As the founding graduate advisor of UCR's program in Materials Science and Engineering, he developed its entire curriculum; the program started in 2010 and has currently ~60 graduate students. Bartels published more than 60 scientific publications, some generating broad public interest.

**Host:**  
**Dr. Axel Enders**  
 Department of  
 Physics & Astronomy

**Please Post**

**Thursday, March 19, 4:00 pm**

**136 Jorgensen Hall**

***Refreshments in Jorgensen Hall vending area - 3:30 pm***