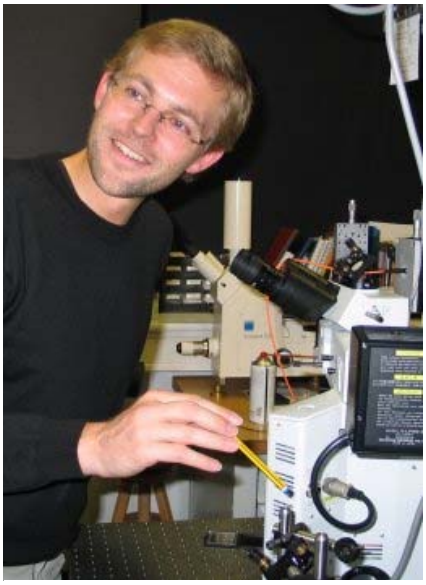
William R. Wiley
EMSL In Brief
Environmental Molecular Sciences Laboratory

Raschke Receives National Science Foundation Career Award



Markus Raschke

Markus Raschke, an Environmental Molecular Sciences Laboratory user from the University of Washington, has received a prestigious Career Award from the National Science Foundation. The Career Award is one of the NSF's most prestigious awards in support of the early career development activities of those teacher-scholars who most effectively integrate research and education within the context of the mission of their organization.

Raschke received the award from the NSF's Division of Chemistry for the research project "Spatio-Temporal Imaging and Spectroscopy of Ultrafast Electron and Vibration Dynamics on the Nanoscale." As part of this award, he will receive $640K over the next 5 years to further his research.

Raschke, an Assistant Professor in the UW's Department of Chemistry, is using EMSL's new Focused Ion Beam/Scanning Electron Microscope as well as clean room microfabrication capabilities to support NSF-funded research addressing fundamental questions about the electron and vibration dynamics of nanoconfined systems. To achieve simultaneous ultrahigh temporal and nanometer spatial resolution, he and his group are combining femtosecond time-resolved spectroscopy with optical near-field microscopy techniques. The local optical field enhancement of scanning probe tips is providing the necessary spatial field confinement. The proposed work under this award includes probing the electron dynamics in individual plasmonic nanocrystals to provide insight into the time scale and efficiency of different relaxation channels and their correlation with structural parameters. Similarly, studying the vibrational dynamics is allowing the researchers to distinguish spatial and temporal decoherence in molecular nanostructures.

The associated changes in the natural time scales of the elementary excitations of matter that occur when the dimensions of the medium shrink into the 1- to 100-nm range represent a new regime of ultrafast electron and lattice dynamics—an investigation made possible by spatio-temporal imaging and spectroscopy. The examination of the femtosecond dynamics on mesoscopic-length scale contributes to a fundamental understanding of the underlying optical excitations necessary for the targeted design of functional optical materials for nanophotonic devices for signal transduction and molecular sensing.

For more information, contact Mary Ann Showalter (509-371-6017).