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**GRADUATE RESEARCH OPPORTUNITIES AT THE  
UNIVERSITY OF WISCONSIN, MADISON**

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**PETROLOGY, GEOCHEMISTRY, ECONOMIC GEOLOGY  
MINERALOGY, AND STRUCTURAL GEOLOGY**

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The Department of Geology and Geophysics offers an exceptionally diverse program in igneous and metamorphic petrology, geochemistry, economic geology, stable and radiogenic isotope geochemistry, and structural geology. We encourage a high degree of interaction between these fields, and the use of multiple techniques to solve research problems. State-of-the-art laboratories offer extensive analytical facilities: ion microprobe, electron microprobe; mass spectrometers for geochronology and stable isotopes; SEM, XRD, TEM, FTIR; and fluid inclusions. Other departmental and campus facilities are available. The Department Web page is located at <http://www.geology.wisc.edu>.

*Philip E. Brown*

**ECONOMIC GEOLOGY AND ORE PETROLOGY**

Current studies include deciphering the geochemistry of natural fluid inclusions, tracing fluid/rock interactions in skarns, studying platinum group element mineralization in the Duluth Complex, and probing the origins of Archean lode gold deposits in Australia.

Phone: (608) 262-5954; Email: [pbrown@geology.wisc.edu](mailto:pbrown@geology.wisc.edu)

*Laurel Goodwin*

**STRUCTURAL GEOLOGY, FLUID-FAULT INTERACTIONS**

Research in New Mexico, California, and Australia includes: localization of deformation at all crustal levels; faulting of granular porous media and its impact on multi-phase fluid flow above and below the water table; the geophysical signature of fault-zone structures; length scales of fault and shear-zone heterogeneities.

Phone: 608-262-265-4234; Email: [laurel@geology.wisc.edu](mailto:laurel@geology.wisc.edu)

*Clark M. Johnson*

**RADIOGENIC ISOTOPE GEOCHEMISTRY**

Research application of radiogenic isotopes to problems on the origin and evolution of volcanic and plutonic rocks in the continental crust, and models of crust and mantle growth. In addition, our work applies geochronological approaches to problems in metamorphism and tectonics, as well as sedimentary provenance. Other work includes using the isotopic compositions of intermediate-mass elements to trace geochemical cycling of transition metals throughout Earth's history.

Phone: (608) 262-1710; Email: [clarkj@geology.wisc.edu](mailto:clarkj@geology.wisc.edu)

*Eric E. Roden*

**GEOMICROBIOLOGY, BIOGEOCHEMISTRY, MICROBIAL ECOLOGY**

Biogeochemistry of aquatic environments, emphasizing in situ rates of and controls on microbial metabolism in anaerobic soils and sediments; role of anaerobic microbial processes in geochemical cycling and energy flow in sedimentary systems; physiology and ecology of anaerobic respiratory bacteria; influence of anaerobic microbial processes on the mobility and fate of metals and organic contaminants in soils/surface sediments and groundwater aquifer sediments. Phone: (608) 890-0724; Email: [eroden@geology.wisc.edu](mailto:eroden@geology.wisc.edu)

*Nita Sahai*

**AQUEOUS- & BIO-GEOCHEMISTRY, BIOMATERIALS**

Thermodynamics and kinetics of sorption, precipitation, and dissolution reactions at the mineral-organic-water interface, mineral precipitation by organisms (biomineralization), chemistry of biomaterials (clinical-medical applications). Approaches include classical and quantum theory, spectroscopy and analytical chemistry.

Phone: (608) 262-4972; Email: [sahai@geology.wisc.edu](mailto:sahai@geology.wisc.edu)

*Brad Singer*

**<sup>40</sup>Ar/<sup>39</sup>Ar GEOCHRONOLOGY, IGNEOUS GEOCHEMISTRY**

Origin of magma and evolution of Quaternary volcanic systems in circum-Pacific subduction zones; linking volcanic and magmatic processes through geochronologic, petrologic, and U-Th isotope disequilibrium studies. Temporal constraints on geomagnetic field behavior, including reversals and secular variation. Geochronology of Quaternary climate in the Southern Hemisphere. Surface exposure dating using cosmogenic nuclides.

Phone: (608) 265-8650; Email: [bsinger@geology.wisc.edu](mailto:bsinger@geology.wisc.edu)

*Basil Tikoff*

STRUCTURAL GEOLOGY & TECTONICS

Research includes fieldwork (California, Idaho, Utah, Canadian Shield, and Norway), theoretical strain analysis, magnetic analysis (paleomagnetism and AMS), numerical modeling, and physical (scaled) modeling, particularly related to three-dimensional deformation. Phone: (608) 262-4678; Email: basil@geology.wisc.edu

*John Valley*

STABLE ISOTOPE GEOCHEMISTRY, METAMORPHIC PETROLOGY

Research projects explore stable geochemistry of igneous, metamorphic, and sedimentary rocks; the role of fluids in the crust; mineral reaction and exchange kinetics; the genesis of granulites; Precambrian geology; and thermo-barometry. Research includes field work (Canadian Shield, western U.S., Scotland, Australia) in combination with in situ analysis by ion microprobe. Phone: (608) 263-5659; Email: valley@geology.wisc.edu

*Huifang Xu*

MINERAL SCIENCE, NANO-GEOSCIENCE, AND ELECTRON MICROSCOPY

My research focuses on interdisciplinary study of (1) crystal chemistry of clays and rock-forming minerals; (2) geochemical reactions in nanopores and nanotubes; (3) biomimetic growth of minerals/crystals and self-assembled nano-structured minerals; (4) nano-porous and nanostructured materials/minerals for waste management (such as immobilization of toxic metals and organic pollutants); (5) trace metal partitioning between mineral crystals and aqueous solutions; and (6) mineral proxies for paleo-environment changes. Phone: (608) 265-5887; Email: hfxu@geology.wisc.edu

