

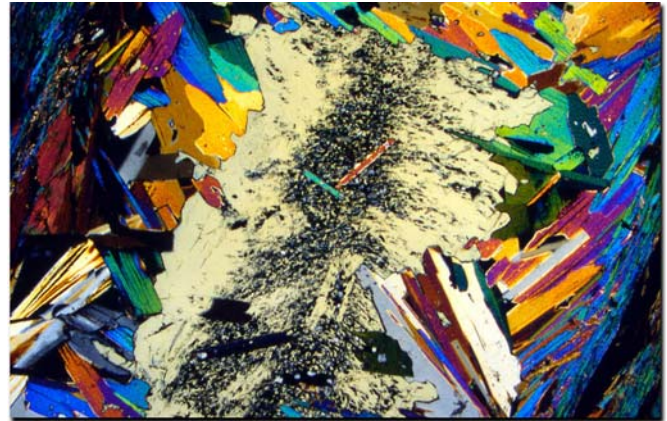
Louisiana State University

Department of Geology and Geophysics

PETROLOGY, MINERALOGY AND MATERIALS SCIENCE

The processes that form then modify rocks, minerals and sediments are critical to understanding the evolution of the Earth and other planets. LSU has a wide range of expertise in dealing with terrestrial, extraterrestrial and synthetic materials. LSU faculty and students have access to the analytical tools necessary to solve a wide variety of mineralogical, petrologic and geochemical problems. Current student and faculty research in petrology, mineralogy and materials span from the Earth's surface to deep crust, and even to Mars, and from most recent times to the earliest history of the Earth. These general topics include:

- Early Earth genesis and evolution
- Tectonometamorphism of lower and middle crustal rocks
- Thermal and fluid evolution of metamorphic terrains
- Mineral chemistry as a guide to petrogenesis
- Spectroscopy of extraterrestrial materials
- Geochemical and temporal characteristics of flood basalts
- Diagenesis and fluid flow through sedimentary rocks
- Crust/mantle recycling and mantle heterogeneity
- Evolution of carbonate platforms

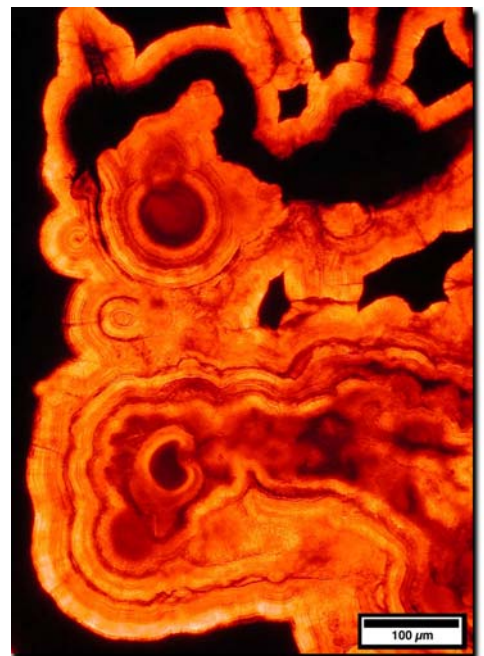


Partial muscovite pseudomorph after staurolite from W Maine (Dutrow)

ACTIVE RESEARCH PROGRAMS

Current faculty and student research projects at LSU have the following long-term research goals:

- Early Earth studies through detailed field, geochronological and petrologic investigations of the Archean rocks of South Africa and the Wyoming Province, North America (*Byerly, Henry*)
- Effects of large meteorite impacts in the geological record (*Byerly*)
- Tectonic models based on metamorphic petrologic investigations of deep-to-shallow crustal rocks (*Henry*)
- Modeling of realistic constraints on the chemical and mechanical interactions within metamorphic terrains through combinations of field, analytical, experimental and theoretical approaches (*Dutrow*)
- Mineral chemical and cathodoluminescent characteristics that provide insights into the thermal/baric history of metamorphic rocks and the provenance of clastic sedimentary rocks (*Henry*)
- Utilization of flood basalt and komatiite geochemistry and geochronology as a window into the mantle (*Baksi*)
- Mössbauer spectroscopy of Mars-analog materials and analysis of such spectroscopy from ongoing spacecraft missions (*Schaefer*)
- Application of clay mineralogy and stable isotopes to diagenesis and fluid flow in sedimentary rocks (*Ferrell*)
- Employment of synchrotron source tomographic techniques to investigate the porosity and permeability structure of fine-grained sedimentary rocks (*Nunn*)
- Understanding the genesis of arc and ocean island magma through lithium isotope studies (*Chan*)



Goethite and todorokite from South Africa (Byerly)

ANALYTICAL FACILITIES AND TECHNIQUES

- Rock preparation laboratory including thin and polished sections, rock/core layout, mineral separations, rock powdering
- Optical microscopy laboratory with digital imaging capabilities
- Technosyn cathodoluminescence microscope and camera
- JEOL 840A Scanning electron microscope with digital secondary and backscattered electron imaging capabilities, energy dispersive spectrometer and color-cathodoluminescence detector
- JEOL JXA-733 Electron microprobe with four automated wavelength dispersive spectrometers, digital secondary and backscattered electron imaging capabilities and energy dispersive spectrometer.
- Bruker/Siemens D5000 automated powder X-ray diffractometer with Rietveld analysis software.
- Finnigan MAT 262 thermal ionization mass spectrometer
- Perkin Elmer 3300 atomic absorption spectrophotometer and furnace system
- Perkin Elmer 3300 DV dual view optical emission inductively coupled plasma spectrophotometer
- Dionex 500 ion chromatography system
- Visualization software packages associated with several UNIX and LINUX workstations
- Tomographic capabilities using the synchrotron source at LSU's Center for Advanced Microdevices

FIELD AREAS

- Antarctica
- Beartooth Mountains, Montana
- Central America and other volcanic arcs
- Guilin, China
- Gulf of Mexico outer continental shelf and slope
- Hawaii and south Pacific ocean islands
- Mars
- Northwest Maine
- Sawtooth Mountains, Idaho
- South Africa



Large xenoliths in 2.8 Ga granitic rocks, Beartooth Mtns, MT (Henry)

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