

Opportunities at light source and neutron facilities

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New intense sources of radiation at national facilities in Chicago, New York, and Tennessee coupled with the next generation of sensitive detectors are allowing geochemists like John Parise to gather images and data on minerals in one second that would take years of equivalent exposure on conventional laboratory x-ray facilities.

John Parise, professor, mineralogist and solid-state chemist at Stony Brook University, New York, discussed this and other new [light source](#) systems available to geochemists today at this year's Goldschmidt Conference, hosted by the University of Tennessee, Knoxville, and Oak Ridge National Laboratory.

The enhanced power of x-rays and pulsed neutrons -- especially at the new [Spallation Neutron Source](#) facility at Oak Ridge National Laboratory -- give geochemists more sensitive tools to detect, characterize and understand the mineral components and the contaminants they absorb or release. Identifying these minerals and how they change with varying conditions such as temperature, relative humidity and irradiation hold the key to understanding the evolution of planetary surfaces, including that of our Earth.

Parise and his colleagues have been studying ferrihydrite, a common iron oxide composed of minute crystals. The structure of ferrihydrite is impossible to get right by studying it with conventional laboratory x-ray techniques. However, by using high-energy x-rays created in a synchrotron storage ring accelerating electrons, the research team has

been able to identify the [atomic arrangement](#) of the ferrihydrite crystals as a relative of aluminum oxyhydroxide. The discovery of this basic structure has enabled Parise to show how environmental contaminants attach to the surface of this iron oxide.

"The need to look at materials in new ways has changed the science culture for some scientists who use these sources -- the very way they do science," Parise said. He discussed the importance of accessibility and continued development of light source and neutron facilities at the conference.

More information: This year's Goldschmidt Conference is being held in Knoxville, Tenn., during the week of June 13-18.

Provided by University of Tennessee at Knoxville

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