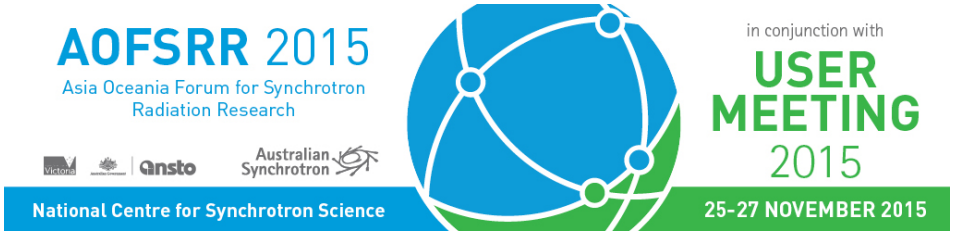


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# Investigating extreme states of matter by x-ray absorption spectroscopy

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The last decades have witnessed an unprecedented surge in the study of matter and materials at extreme values of pressure, temperature, and magnetic field. The fundamental importance of this research stems from the fact that such extreme conditions can deeply modify chemical bonds and induce myriad changes in materials. Many breakthroughs have been achieved at synchrotrons worldwide, in fields ranging from Earth and planetary sciences to fundamental physics, chemistry and materials research, and even in the life sciences where questions on life and biological function under extreme conditions have been studied.
The European Synchrotron Radiation Facility is approaching the end of the Phase I of its upgrade program. One of the first upgrade beamlines to become operational has been designed to provide state-of-the-art conditions to perform time resolved and extreme conditions x-ray absorption spectroscopy. The strategy exploits the micron size focal spot to reduce the interaction zone, the high flux and the fast acquisition scheme to reduce the interaction time, and ultimately to drastically reduce the energy needed to reach extreme thermodynamical states.
Target experiments for the coming years include kinetic studies of chemical reactions at high pressure and temperature, and investigation of extreme states of matter that can be maintained only over very short periods of time. Preliminary data will be shown from the first attempts to probe the electronic and local structure in melts at high pressures and in laser-shocked matter.

## Keywords

X-ray Absorption Spectroscopy, Extreme Conditions, Energy Dispersive XAS

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