



Physics Colloquium

Friday, November 5, 2010, 4:00 pm, PS 3046

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*Analyzing aqueous fluids and melts at
conditions of extreme temperature and
pressure in a diamond anvil cell*

The hydrothermal diamond anvil cell (HDAC) has been developed for the study of aqueous solutions and their interactions with other phases at extreme pressures and temperatures. The HDAC can provide pressures up to about 10 GPa and span a temperature range from -190 to 1200°C. It has been used in studies of equations of state of fluids, reactions between fluids and solids, hydration and dehydration of hydrous solids under $P_{\text{H}_2\text{O}}$, fractionation of elements between phases, the effect of $P_{\text{H}_2\text{O}}$ on melting of silicates, the determination of the local structure of ions in solution, and reactions in clathrates and other organic materials. Various visual, spectroscopic, and X-ray techniques are used to directly characterize samples at different temperatures and pressures by taking advantage of the exceptional transparency of the diamond anvils. Recent developments in the design and application of the hydrothermal diamond anvil cell for studies of aqueous fluids and hydrous melts at temperatures and pressures up to and beyond the critical point of water will be discussed.