

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Structure of high-PT water and mineral interface with high-resolution x-ray reflectivity**<sup>1</sup> HONGPING YAN, CHANGYONG PARK, Carnegie Institution of Washington — Hydration and chemistry at mineral-water interface are fundamental to control mineral dissolution and growth at microscopic level. The structure is crucial to describe the interfacial processes such as electrical double layer and ion exchange. Density profiles across various mineral-water interfaces revealed characteristic water orderings in accordance with the termination and morphology of mineral surfaces [1]. The previous observations, however, have been limited to ambient pressure conditions due to the lack of proper instrument to handle extreme conditions (e.g., high-pressures). Here, we developed a high-pressure and high-temperature (high-PT) aqueous interface cell specifically designed for high-resolution x-ray reflectivity measurement from mineral-water interface under pressure up to 40 MPa and a temperature up to 770K. The first demonstration is presented with a few examples including olivine (010)-water interface. Observation of structure and reactivity of hydrothermal fluids on mafic and/or ultramafic mineral surfaces can provide a fundamental basis of our understanding of the hydration process of mineral surface in deep-sea environment. [1] Fenter, P. and Sturchio, N.C., 2004, Mineral-water interfacial structures revealed by synchrotron X-ray scattering, Progress in Surface Science 77, 171-258

<sup>1</sup>Work under auspice of Deep Carbon Observatory supported by Sloan Foundation and HPCAT supported by CIW, CDAC, UNLV and LLNL through funding from DOE-NNSA and DOE-BES.

Hongping Yan  
Carnegie Institution of Washington

Date submitted: 08 Nov 2012

Electronic form version 1.4