

Surface selective investigation of adsorption of mercury: Importance of surface on Hg chemical kinetics

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A large source of uncertainty in the atmospheric modelling of mercury cycling is the lack of knowledge of mercury chemistry at various surfaces. Mercury, with surface tension of 486.5 mNm^{-1} at 25°C , can exhibit propensity for numerous surfaces, e.g. air/water, gas/aerosol, air/snow interfaces, in the atmosphere. Moreover, adsorption of mercury compounds on to the glass surface of the reaction chamber commonly used in determining the rate constant of gas-phase mercury reactions leads to uncertainty in the kinetic parameter [1 - 3]. However, the adsorption mechanism of mercury on to these surfaces is not well understood and characterized [1]. Using a series of the state-of-the-art surface facilities, we have studied Hg adsorption properties of gaseous elemental mercury and oxidized mercury compounds on several atmospheric relevant surfaces. We will discuss the impact of our results on mercury chemical schemes parameterization in the atmospheric global circulation models.

[1] Ariya, P. A. Peterson, K. Snider, G. Amyot, M. (2009) In *Mercury Fate & Transport in the Global Atmosphere*, Pirrone, N. Mason, R. Eds. Springer, New York. [2] Hynes, A. J. Donohoue, D. L. Goodsite, M. E. Hedgecock, I. M. In *Mercury Fate & Transport in the Global Atmosphere*, Pirrone, N. Mason, R. Eds. Springer, New York, 2009. [3] Lin, C.-J. Pongprueksa, P. Lindberg, S. E. Pehkonen, S. O. Byun, D. Jang, C. (2006) *Atmospheric Environment* **40**, 2911–2928.

Synchrotron powder diffraction simplified: The high-resolution diffractometer 11-BM at the Advanced Photon Source

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Synchrotrons have revolutionized powder diffraction. They enable the rapid collection of entire, high quality, powder diffraction patterns with tremendous resolution and superb signal to noise. The high penetration and exceptional data sensitivity possible at high energy light sources allows synchrotrons to explore trace containment levels, extreme sample environments and crystallographic site occupancies. Despite these advantages, relatively few scientists today consider using a synchrotron for routine powder diffraction studies.

To address this, the new synchrotron powder diffractometer beamline 11-BM at Argonne's Advanced Photon Source now offers rapid and easy mail-in access for routine structural analyses with truly world-class quality data. This instrument offers users the highest resolution available in the Americas and is a free service for all non-proprietary users. With both vertical and horizontal focusing and a detection system based on twelve perfect crystal analyzers, the diffractometer can collect a superb pattern suitable for Rietveld analysis in less than an hour. The instrument is equipped with a robotic arm for automated sample changes, and features variable temperature sample environments. Users of the rapid access mail-in program can expect to receive their high-resolution data within two weeks of sample receipt. The diffractometer is also available for on-site experiments required more specialized measurements.

Our presentation will describe this instrument, highlight its capabilities, explain the types of measurements currently available, and discuss plans to improve access and available sample environments. We are particularly interested in seeking input from potential users in the geochemistry and environmental science community.

More information about the 11-BM diffractometer and its associated mail-in program can be found at our website: <http://11bm.xor.aps.anl.gov>.