

Applications of synchrotron radiation to processes at environmental interfaces

G.E. BROWN JR.^{1,2}, K. BENZERARA³, T.H. YOON⁴, J. HA¹, C.D. CORDOVA⁵, A.M. SPORMANN⁵, T. TYLISZCZAK⁶, K.S. TANWAR⁷, T.P. TRAINOR⁷, P.J. ENG⁸, T. KENDELEWICZ¹, S. YAMAMOTO², H. BLUHM⁶, G. KETTELER⁹, M. SALMERON⁹, and A. NILSSON²

¹Dept of Geological & Environmental Sciences, Stanford University, Stanford, CA 94305-2115, USA,

gordon@pangea.stanford.edu, ²Stanford Synchrotron Radiation Laboratory, Stanford CA, USA, ³Institut de Minéralogie et Physique des Milieux Condensés,

University of Paris 6 -7, ⁴Dept of Chemistry, Hanyang University, 17 Haengdang-dong, Seongdong-gu, Seoul, 133-791, Korea, ⁵Dept of Civil & Environmental

Engineering, Stanford University, Stanford, CA, USA, ⁶Chemical Sciences Division, Lawrence Berkeley

National Laboratory, Berkeley, CA, USA, ⁷Dept of Chemistry & Biochemistry, University of Alaska,

Fairbanks, AK, USA, ⁸Consortium for Advanced Radiation Sources, University of Chicago, Chicago, IL,

USA, ⁹Materials Science Division, Lawrence Berkeley National Lab, Berkeley, CA, USA

We have conducted a series of studies of processes at various environmental interfaces using a number of SR methods aimed at defining interfacial structures, the structure and composition of reaction products, and reaction conditions in model systems. CTR diffraction was used to determine the structures of Fe and Al oxides in contact with water, which provides insights about differences in reactivity of different surfaces of these solids to water and aqueous cations. PES was used to study the initial reaction of water with these surfaces, which provides information on defect densities and reactivity. XSW spectroscopy was used to study competitive reactions of various cations and oxoanions on these surfaces, and STXM was used to study (1) aragonite-bacteria-EPS interfaces in a modern microbialite from Lake Van, Turkey, (2) *Shewanella oneidensis* MR-1-hematite interfaces in pH 7.4 solutions; and (3) black carbon surfaces before and after interaction with polychlorinated biphenyls (PCBs). Results from these studies will be presented and integrated to provide insights about factors controlling reactivity and mineral-microbe interactions.



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