



Experiment title: Behavior of arsenic upon microbial reduction of As-doped iron oxides :implications for arsenic mobility in groundwaters.	Experiment number: 30-02-838	
Beamline: BM30B (FAME)	Date of experiment: from: 21 November 2007 – 27 November 2007	Date of report: Sept. 20 2008
Shifts: 15	Local contact(s): Dr. Denis TESTEMALE	<i>Received at ESRF:</i>

Names and affiliations of applicants (* indicates experimentalists):

Dr. Guillaume MORIN* CNRS – IMPMC - Paris

Dr. Georges ONA-NGUEMA CNRS – IMPMC - Paris

Dr. Yuheng WANG* CNRS – IMPMC - Paris

Claudia HOHMANN* PhD Student (Univ. Tuebingen)

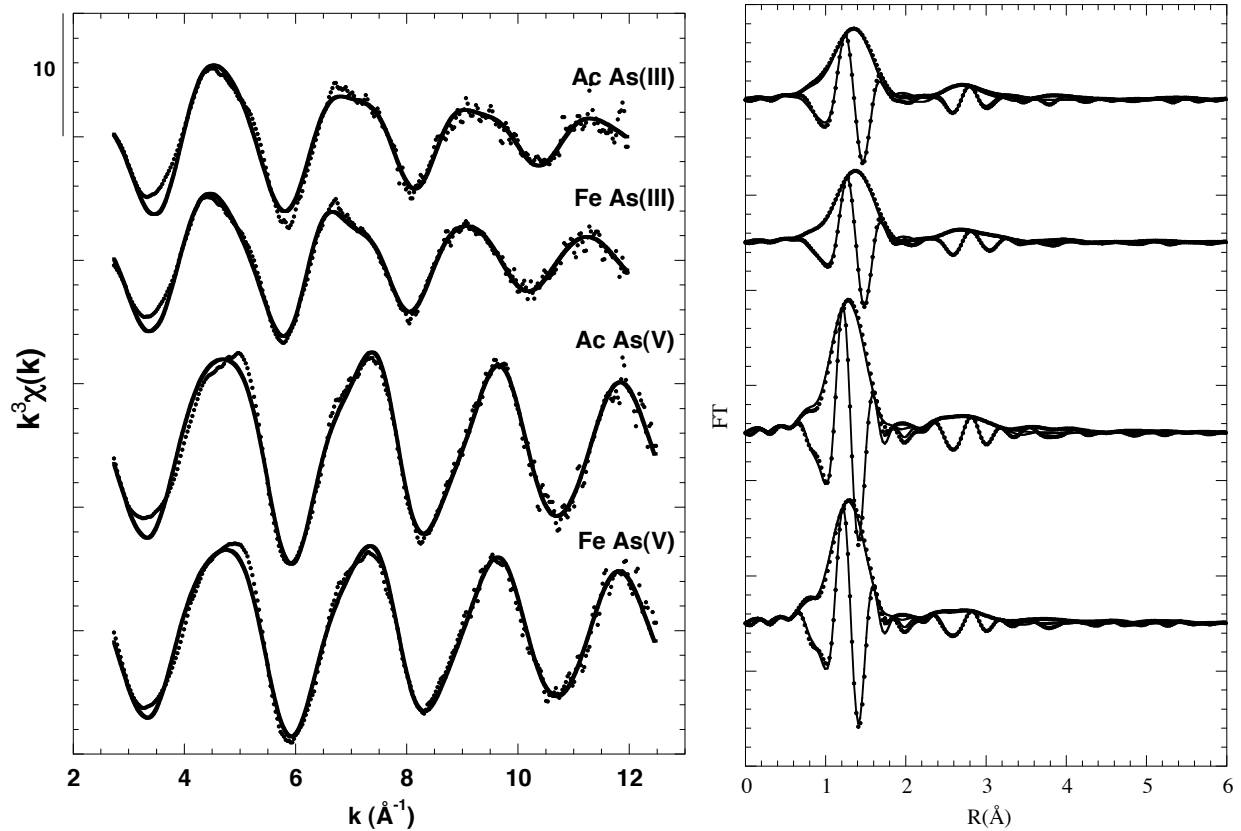
Mohamad FAKIH* PhD student (CAREN – Rennes)

Report:

The objective of this proposal was to determine arsenic speciation in crystalline and amorphous mineral phases forming upon bacteria driven reaction in laboratory model systems, simulating anoxic groundwater conditions.

During the (15 shifts) beamtime EXAFS and XANES data were recorded at the As K-edge in fluorescence detection mode using 30 Ge-elements detectors, at a temperature of 10-15 K, using a liquid He cryostat. The monochromator was equipped with Si(220) crystals and the whole experiment was done using dynamic sagittal focusing of the second crystal. XANES data were recorded within the same scans as EXAFS data, by defining various regions in the scan.

22 samples were analyzed with As concentrations varying within the 100 – 10000 ppm range. The data were of good quality, combining good energy resolution to good signal to noise ratio after 4 to 15 scans, depending on the As concentration. Particular attention was paid to limit beam damage by working at low temperature and by moving the sample between each EXAFS scan. Part of the data are included in a forthcoming publication (Fakih et al., submitted).



Unfiltered EXAFS data of microbial incubation of As-doped iron bearing waters showing As(III) or As(V) sorption at the surface of the biogenic iron (oxyhydr)oxides. Dotted lines : experimental ; Solid lines : shell-by-shell fit.

M. Fakih , M. Davranche, A. Dia, B. Nowack, G. Morin, P. Petitjean, X. Châtellier and G. Gruau. Environmental impact of As(V)-Fe oxyhydroxide reductive dissolution: an experimental insight from *in situ* monitoring. Submitted to *Chemical Geology*.