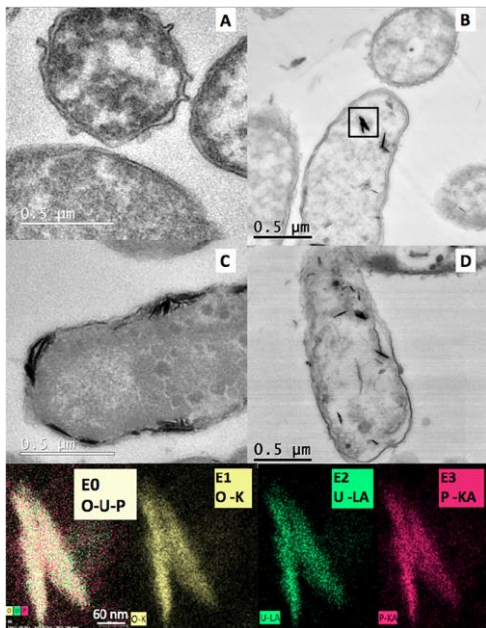
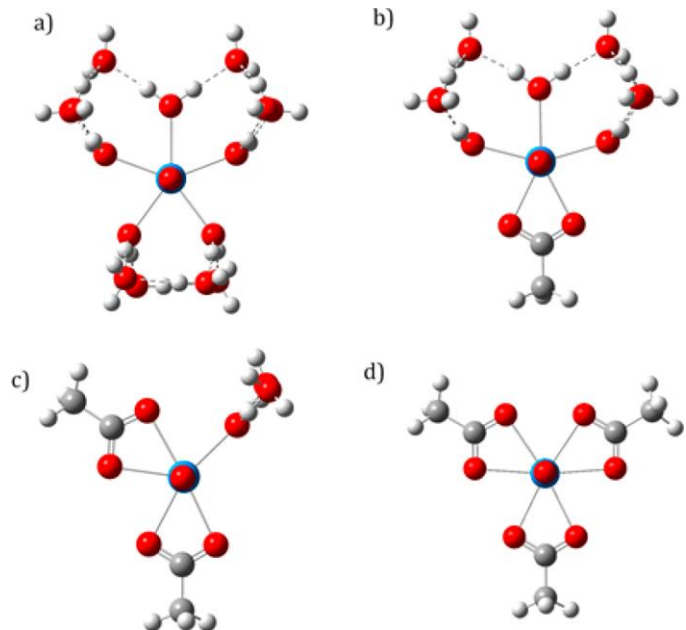


Nuclear Waste – How to deal with it safely



TEM pictures of bacteria exposed to uranium in alkaline and saline solutions to investigate formation of collids in and outside the cells



Uranyl water and uranyl acetate complexes used to work out Gibbs Free energy of the reactions in solution

The aqueous chemistry of actinides is very intricate and difficult to study due their reactivity, redox chemistry and acid /base behaviour. However, some of the major global challenges to environmental quality are associated with this element group and my group is in particular studying the interactions of uranium with mineral and organic substrates.

Our interest focuses on the actinide geochemistry in alkaline solutions. The release of uranium from disintegrating cement containers is the critical controlling process during leakage of radio nuclides form nuclear waste repositories but the controlling biogeochemical processes are widely debated. Recent work of our group supports the hypothesis that the formation of colloids is a major controlling process but it remains unclear how these colloids are formed and if these lead to an increase in mobility. We are in particular interested in understanding better the role of host rock and of microorganism and organic ligands in colloid stability and formation

Contact:

Professor Dominik Weiss (d.weiss@imperial.ac.uk) for more information. Details for how to apply can be found at (www.imperial.ac.uk/study/pg/apply/how-to-apply)

Relevant Literature:

- 1 Kenney, J. P. L., Kirby, M. E., Cuadros, J. & Weiss, D. J. A conceptual model to predict uranium removal from aqueous solutions in water-rock systems associated with low- and intermediate-level radioactive waste disposal. *RSC Advances* 7, 7876-7884, doi:10.1039/c6ra26773d (2017).
- 2 Kirby, M. E., Simperler, A., Krevor, S., Weiss, D. J. & Sonnenberg, J. L. Computational tools for calculating log_b values of geochemically relevant uranium organometallic complexes. *J. Phys. Chem. A* DOI:10.1021/acs/jPCA.8b06863 (2018).
- 3 Kenney, J. P. L., Ellis, T., Nicol, F. S., Porter, A. E. & Weiss, D. J. The effect of bacterial growth phase and culture concentration on U(VI) removal from aqueous solution. *Chemical Geology* 482, 61-71, doi:10.1016/j.chemgeo.2018.01.025 (2018).