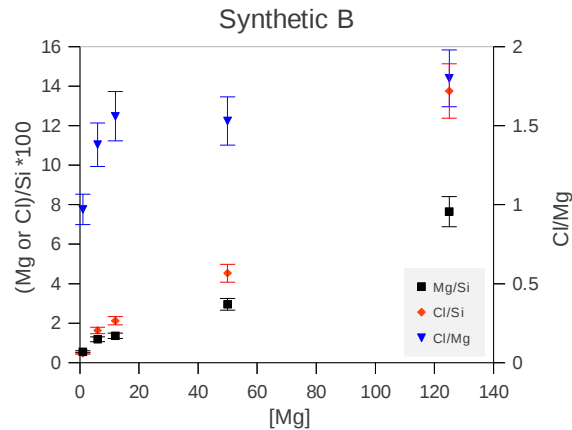


Interaction of clay minerals with saline solutions and organic molecules

Progress Report- October, 2013.

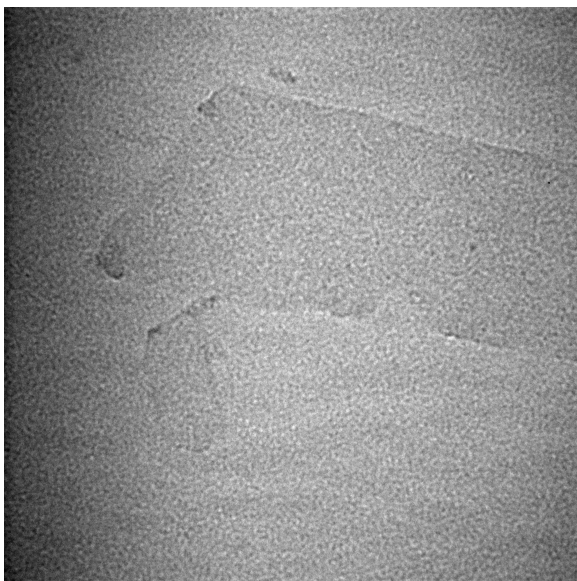
Stanislav Jelavić

Last 6 months I spent characterising nanosized particles that can be found on particle surfaces of many oil-bearing rocks and sediments, and looking at adsorption and organisation of Mg^{2+} and Cl^- on kaolinite. Adsorption studies are important in order to understand how positive and negative charges organise on clay mineral surfaces. We prepared and equilibrated kaolinite in different $MgCl_2$ solutions using constant solid/liquid ratio at a range of concentrations (1, 6, 12, 50, 125 mM) and we fast froze the wet paste directly in the spectrometer's antechamber using a liquid nitrogen cooled stage (cryo-XPS). In this way we prevent solutions from crystallising and minimise water from sublimation which allows us to observe water on the surface in its "liquid" state.

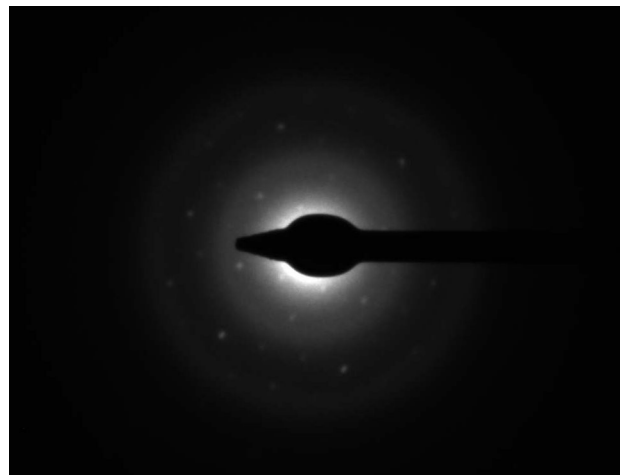


Adsorption of Mg^{2+} and Cl^- on synthetic kaolinite, their ratio and their surface concentrations are normalised to Si from kaolinite.

The efforts are also put into precise characterisation of nanoparticles that we can observe with AFM on different oil-bearing rocks. Their morphology and size resemble clay minerals but further characterisation is necessary. Until now, only TEM coupled with SAED were able to give better insight in their structure.



TEM of nanoparticles extracted from chalk



SAED of the nanoparticle in the left picture