

AeM²AT

Agrupación Estratégica
en Materials

CONFERENCIA INVITADA

**CO₂ Sequestration by Mineral Carbonation
with Iron Complexing using 2,2'-Bipyridine
as Ligand.**



Javier Fernández Reynes

*Institut National de la Recherche Scientifique – Eau Terre
Environnement Research Center (Quebec, Canada)*



Instituto de Cerámica (USC) – Salón de actos



10/01/2020



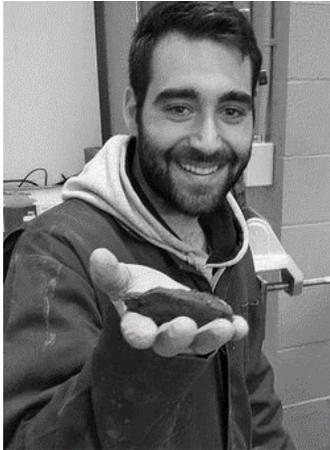
12:30



NANOMAG
Exploring the nanoworld



**XUNTA
DE GALICIA**



Javier Fernández Reynes is a researcher in *Institut National de la Recherche Scientifique – Eau Terre Environnement Research Center (Quebec, Canada)*. His current research is concerned with the development of indirect mineral carbonation processes from mining residues containing fayalite (Fe-rich iron silicates). This topic has a high impact as it provides tools to mitigate climate change by the sequestration of CO₂. Not only does this technology reduce concentration of greenhouse gases but also it could be a source of new materials with applications as building products like bricks, pavers or even plasterboard.

CO₂ Sequestration by Mineral Carbonation with Iron Complexing using 2,2'-Bipyridine as Ligand

ABSTRACT

A new Mineral Carbonation (MC) Design was demonstrated by iron complexation using 2,2'-bipyridine as a ligand to obtain the stable complex [Fe(bipy)₃]²⁺ which avoids iron hydroxide precipitation and leaves, in reaction with CO₂(aq) in a basic medium, the formation of iron carbonate. First, a leaching step of the mining residue was necessary to extract the cations (Fe mainly) for the MC. The leaching acid used was ammonium bisulphate (NH₄HSO₄). Afterwards, 2,2'-bipyridine was added to form the complex ([Fe(bipy)₃]²⁺) and stabilize the iron in solution. The complex stability for 7 days between pH 1-12 were studied using UV-Vis spectroscopy. Afterwards, the CO₂(aq) was reacted with [Fe(bipy)₃]²⁺ at different temperature (25, 60 and 80 °C) and pH (9-12) conditions. NaOH was used as a base to increase the pH. The effectiveness of the reaction was followed by TIC and ICP-OES Analysis. The precipitate samples obtained were characterized by SEM-EDS, CHNS and ICP-OES to verify carbonate production.

Finally, in order to know if it would also be economically viable for a future industrial establishment, a recirculation study of 2,2'-bipyridine and leaching acid (ammonium bisulfate) was carried out for reuse in the process, which would reduce costs and make it suitable for industry.