GEOLOGICAL AND MINERALOGICAL ASPECTS ON MINERAL CARBONATION OF ROCKS AND MINE TAILINGS

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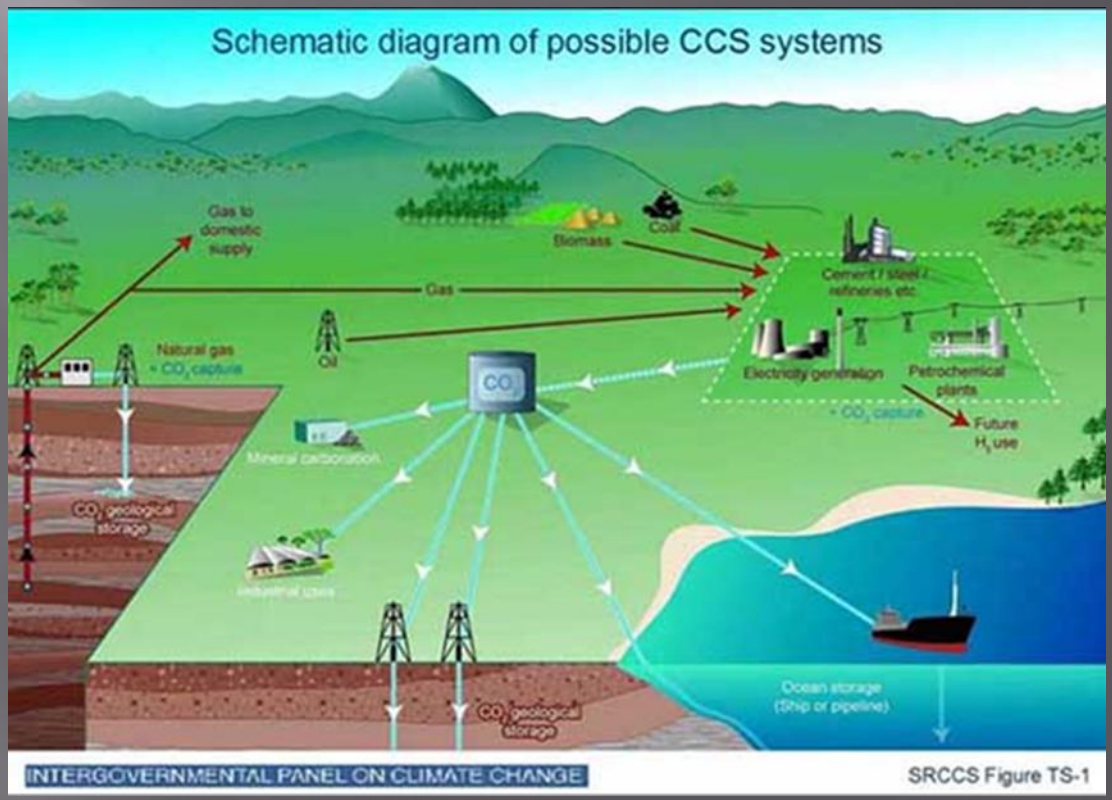
Anthropogenic CO_2 emissions and climate change

Carbon Capture and Storage
– CCS

Carbon Capture and Mineralization
– CCM



My research

Questions to be answered:

1: What are the abilities of different minerals and rocks to bind carbon dioxide?

2: How the origin of the rocks affects the tests?

3: Why some minerals have higher reactivity than others?

4: What circumstances produce the most cost-effective results?

Materials

Test materials: Mine tailings / waste rocks

Cooperating mines: Kevitsa, Hitura, Pampalo, Horsmanaho (Mondo Minerals) and Talvivaara

Main interest: ultramafic rocks with low SiO_2 and high MgO content

Mg-rich host rocks provided :

olivine $(Mg,Fe)_2SiO_4$

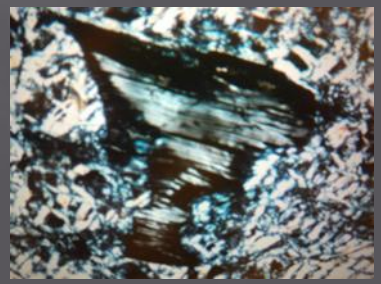
serpentine $(Mg,Fe)_3Si_2O_5(OH)_4$

chlorite $(Mg_5Al)(AlSi_3)O_{10}(OH)_8$

pyroxene $Ca(Mg,Fe)Si_2O_6)$

talc $Mg_3Si_4O_{10}(OH)_2$

The most promising rock type: Serpentinite



Methods

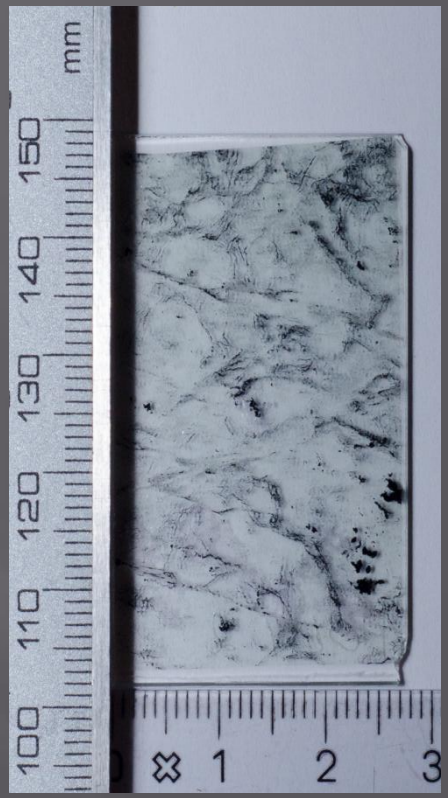
Mineralogy and structure (optic microscope)

Surface analyses (Scanning electron microscope, SEM)

Mineral phases (X-ray Diffraction, XRD)

Chemical composition (X-ray Fluorescence, XRF)

Bonding environments (Electron Spectroscopy for Chemical Analysis, ESCA)



Examples of CCM in practice

Information considering examples of CCM in practice can be found (e.g) in:

Gunning PJ, Hills CD, Carey PJ 2009.
Production of lightweight aggregate from industrial waste and carbon dioxide.
Waste Management 2009 Oct;29(10):2722-8

More examples on green building can be found on:

www.lignacite.co.uk

Thank you!

(Choosing wisely gives us delicious wine and beer in the future)