

## Dypingite series defined by the content of molecular H<sub>2</sub>O

YANG LU<sup>1</sup>, ANTON SEDNEV-LUGOVETS<sup>2</sup>, PATRICIA CARVALHO<sup>3</sup>, MATYLDA GUZIK<sup>2</sup>, KRISTINA DUNKEL<sup>4</sup>, HÅKON AUSTRHEIM<sup>4</sup> AND HENRIK FRIIS<sup>1</sup>

<sup>1</sup>Natural History Museum, University of Oslo

<sup>2</sup>Department of Technology Systems, University of Oslo

<sup>3</sup>SINTEF Industry, Department of Sustainable Energy Technology

<sup>4</sup>Physics of Geological Processes (PGP), The Njord Centre, University of Oslo

Presenting Author: yang.lu@nhm.uio.no

Carbonation of ultramafic rocks can effectively reduce atmospheric CO<sub>2</sub> by fixing it as carbonate minerals. One of the main phases, dypingite Mg<sub>5</sub>(CO<sub>3</sub>)<sub>4</sub>(OH)<sub>2</sub>·5H<sub>2</sub>O, has been proved to be stable under Earth surface conditions over hundreds of years. Therefore, the above method could be a safe and feasible scheme to reduce carbon in the atmosphere. In order to increase the carbon-fixing efficiency and explore other environmental friendly applications of dypingite, it is necessary to know the composition and structure of dypingite. However, since dypingite was first described in 1970, its composition and structure have not been fully determined. This study provides initial results that indicate the composition and structure of dypingite collected from the Feragen Ultramafic Complex and Dypingdal, Norway.

Dypingite from both areas forms aggregates of plates resulting in a rose texture. The X-ray diffraction (XRD) patterns of over 100 dypingite samples do not show consistent diffraction peak positions. Major variations are shown at around 8.5°, 16°, and 31° 2θ (Cu radiation), which are all shifting. Thermogravimetric analysis (TGA) indicates that contents of molecular H<sub>2</sub>O change with the position of the above three peaks. This correlation is confirmed by the XRD patterns of dypingite incubated under a series of humidities. Moreover, TGA results suggest a slight change of (CO<sub>3</sub>) and (OH) contents.

Our initial results suggest that dypingite should be considered as a series of phases with different hydration degrees. The number of molecular H<sub>2</sub>O is controlled by the ambient humidity, while the contents of (CO<sub>3</sub>) and (OH) may be influenced by the pH and alkalinity of the precipitating fluid.