

## The PGE contents - $\delta^{13}\text{C}$ correlation in Native Fe(-Pt) ores, Dzhaltul, The Siberian Platform

V.V. RYABOV<sup>1</sup>, V.A. PONOMARCHUK<sup>1,2\*</sup>,  
D.V. SEMENOVA<sup>1</sup> AND A.A. LAPKOVSKY<sup>1</sup>

<sup>1</sup>Institute of Geology and Mineralogy SB RAS, Novosibirsk,  
Acad. Koptyyug av., 3, Russia.

<sup>2</sup>Novosibirsk State University, Novosibirsk, Pirogov st., 2.

(\* correspondence: ponomar@uiggm.nsc.ru)

Native Fe (-Pt) ores are appeared in gabbro-dolerites in the form of native iron nodules [1, 2]. The main minerals of the ores are kamacite, ferrite, cohenite and copper and the minor – C-containing phases: cohenite, graphite, cliftonite anthraxolite, carbonaceous matter and moissanite. PGE are presented as isomorphous admixtures in the native Fe(-Pt) ores. The direct correlation dependence between noble and base metals contents are determined in the native Fe(-Pt) ores [1, 3]. Carbon isotope composition of C-containing phases in Dzhaltul native Fe(-Pt) ores were determined using the Thermo Finnigan 253 mass spectrometer equipped with the Finnigan Elemental Analyser (EA)+ConFlo III preparation unit. In special cases of smaller sample amount, the specially-constructed line in combination with the Finnigan Gas Bench II were used [4, 5]. The data obtained shows weighting of  $\delta^{13}\text{C}$  values among coexistent minerals in order: cohenite -30.9‰, cliftonite -25‰, anthraxolite -22.8‰. It is interesting, that the inverse trend of  $\delta^{13}\text{C}$  values were determined for coexistent C-containing minerals in native iron of island Disco (Greenland): -24.0‰; -26‰ in cohenite and -22‰; -28‰ in graphite [6].

The extensive study of the Dzhaltul native Fe(-Pt) ores have shown that the accumulation of platinoids in native iron is accompanied by the variable  $\delta^{13}\text{C}$  values of organic matter: when PGE contents are changed from 0.08 to 8.3 ppm,  $\delta^{13}\text{C}$  of organic matter increases from -27.6‰ to -18.0‰.

The data obtained are agreed with the author's PGE formation model. The important elements of the model are: a) migration of base and noble metals in form of metalloorganic compounds; b) carbon isotope composition of reducing fluids evolved during oreformation process.

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## Amorphous magnesium stabilized calcium carbonate

C.A. RYAN\*, K. YACCATO, M. GINDER-VOGEL  
AND B. CONSTANTZ

Calera Corporation, Los Gatos, CA, 95032, USA

(\*correspondence: cryan@calera.com)

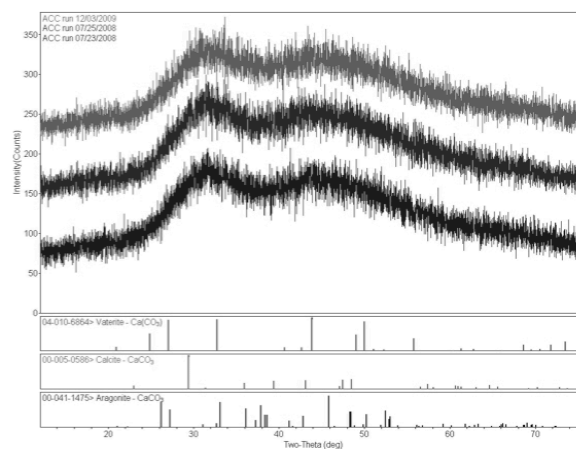
### Calera Process

The Calera Process is focused on capturing  $\text{CO}_2$  from industrial sources (such as coal flue gasses) and sequestering it in the built environment. In order to create novel carbonate materials for cements and aggregates (two of Calera's first products) we have looked to meta-stable forms of calcium carbonate, such as amorphous calcium carbonate (ACC), vaterite, and aragonite.

### Laboratory Investigation of Amorphous Carbonates

During our investigation of carbonates sequestered from flue gas, we have performed laboratory experiments aimed at understanding carbonate morphology and properties. Precipitation of carbonate minerals from  $\text{Na}_2\text{CO}_3$  solutions mixed with  $\text{CaCl}_2$  and  $\text{MgCl}_2$  is a proxy for process conditions of interest to Calera.

The Ca:Mg ratio of these solutions can be expected to affect carbonate morphology [1]. Several Ca:Mg solution ratios were investigated which generated amorphous phases with varying stability. At Ca:Mg = 0.2, long-term stability of the amorphous material was observed, while lower ratios resulted in less stable materials.



Raman spectroscopy of the sample matches the characteristics seen in amorphous calcium carbonate observed in biological specimens [2]. TGA coupled with FT-IR evolved gas analysis of these materials demonstrates the production of  $\text{H}_2\text{O}$  and  $\text{CO}_2$ . Additionally, these materials will be characterized using HR-TEM.

[1] Loste, et. al (2003) *Journal of Crystal Growth* **254**, 206-218. [2] Raz, et. al (2002), *Biological Bulletin*, **203**, 269-274.