

## Highly siderophile and chalcophile element systematics of crust-derived Ligurian garnet pyroxenites

ALESSANDRA MONTANINI<sup>1\*</sup>, AMBRE LUGUET<sup>2</sup>, STEPHAN KÖNIG<sup>2</sup> AND RICCARDO TRIBUZIO<sup>3</sup>

<sup>11</sup> Dip. Fisica e Scienza della Terra, Università di Parma, Italy (alessandra.montanini@unipr.it).

<sup>2</sup> Steinmann Institut, Universität Bonn, Poppelsdorfer Schloss, 53115 Bonn, Germany

<sup>3</sup> Dip. Scienze della Terra e dell'Ambiente, Università di Pavia, Italy

There is growing evidence from major, trace elements and isotopic systematics (e.g. Nd, 187Os, 186Os) that pyroxenites are significant constituents of OIB and MORB sources. Although pyroxenites probably play an important role in the recycling of crustal 187Os and 186Os signatures within the mantle, their highly siderophile and chalcophile element signatures are not well constrained. Here, we present platinum group elements (PGE: Os, Ir, Ru, Pt, Pd), Re, Se, Te and 187Os compositions of nine garnet pyroxenites and two peridotites from the External Ligurian ophiolites (Italy). On the basis of their mineralogical, geochemical and Nd-Hf isotopic features, the pyroxenites (HREE-depleted Type A, HREE-enriched Type-B and retrogressed) were correlated with partial melting of an eclogite source derived from gabbroic protoliths [1]. Whereas the host peridotites exhibit typical mantle-like concentrations and a relatively flat CI-chondrite-normalised HSE patterns, the pyroxenites show large concentration ranges, reaching up to 46 ppb Pd, 538 ppb Se and 81 ppb Te. Their HSE patterns display a positive slope from Os to Re, but with significant differences between the pyroxenites. Type-A pyroxenites show lower Os, Ir, higher Pt, Pd concentrations and flatter Pd-Re segments than Type-B pyroxenites. The retrogressed pyroxenites show mixed signatures with Os-Ir contents similar to Type-B pyroxenites but Pt, Pd concentrations as well as Pd-Re segments similar to Type-A. Selenium and Te are significantly enriched in all the pyroxenites but independently of the pyroxenite groups. The <sup>187</sup>Os/<sup>188</sup>Os ratios vary from unradiogenic in the peridotites (0.1257) to highly radiogenic in the pyroxenites (0.2649-2.4748). Here we show that crust-derived mantle pyroxenites show a large range of highly siderophile and chalcophile elements signatures, which could likely contribute to geochemical and isotopic heterogeneities of the Earth's mantle.

[1] Montanini *et al.* (2012) *EPSL* 351-352, 171-181.

## New insights on the nucleation and growth of chrysotile, magnesite, goethite and calcite

G. MONTES-HERNANDEZ<sup>1</sup>

<sup>1</sup>ISTERRE, University of Grenoble I and CNRS, BP 53, 38041 Grenoble Cedex 9, France  
german.montes-hernandez@ujf-grenoble.fr

Chrysotile, magnesite, goethite and calcite are widespread minerals in Earth systems and other telluric planets. These minerals play an important role on the fate and transport of several trace elements (including the so-called strategic elements or rare-Earth elements of economic interest) and organic molecules at the mineral-fluid interfaces. Particularly, carbonate minerals plays also a crucial role on the global carbon cycle. In general, their formation and textural properties have already been investigated in the past. However, various questions still remain unanswered concerning their formation in natural systems as well as their production at laboratory and industrial scales. In this way, various new results on the nucleation and growth processes of these minerals from macroscopic to nanoscopic scales are summarized in this meeting contribution. In last six years, independent semi-continuous or batch experiments under specific physicochemical conditions were carried out to precipitate chrysotile nanotubes via dissolution of so-called proto-serpentine precursor [1], micro-crystals of magnesite via simultaneous dehydration and carbonation of brucitic layer of dypingite precursor [2], acicular nanocrystals (in width) of goethite from ferric hydroxide gel [3] and nanosized calcite via aqueous or gas-solid carbonation of portlandite [4-5]. I note that the nucleation and growth mechanism routes of these common minerals are still debated, for example, the role of so-called precursor formation and/or pre-nucleation existence addressed in the recent years are not clear at the present time, opening a broad spectrum of experimental and modeling possibilities to decipher this fundamental scientific obstacle.

[1] R. Lafay, G. Montes-Hernandez *et al.* *Chemistry – A European Journal* (2013) DOI: 10.1002/chem.201204105

[2] G. Montes-Hernandez *et al.* *Crystal Growth & Design* 12 (2012) 5233-5240. [3] G. Montes-Hernandez *et al.* *Crystal Growth & Design* 11 (2011) 2264-2272. [4] G. Montes-Hernandez *et al.* *Chemical Geology* 290 (2011) 109-120.

[5] G. Montes-Hernandez *et al.* *Crystal Growth & Design* 10 (2010) 4823-4830.