

Mineralogical and cristallochemical characterizations of Ni-bearing clays

Nicolas Maubec, P.G. Blaineau, Cédric Duée, Anthony Da Silva Alves, B.
Orberger, Xavier Bourrat, Guillaume Wille, M. Le Guen, C
Villanova-De-Benavent

► **To cite this version:**

Nicolas Maubec, P.G. Blaineau, Cédric Duée, Anthony Da Silva Alves, B. Orberger, et al.. Mineralogical and cristallochemical characterizations of Ni-bearing clays. 1st International Workshop on the geochemical cycle of nickel, Oct 2017, Nancy, France. 2017, <<http://www.insu.cnrs.fr/node/6487>>. <hal-01611667>

HAL Id: hal-01611667

<https://hal-brgm.archives-ouvertes.fr/hal-01611667>

Submitted on 6 Oct 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Mineralogical and cristallochemical characterizations of Ni-bearing clays

N. Maubec^{1*}, P.G. Blaineau¹, C. Duée¹, A. Da Silva Alves¹, B. Orberger², X. Bourrat¹, G. Wille¹, M. Le Guen³, C. Villanova-de-Benavent⁴

¹BRGM, 3 avenue Claude Guillemin, BP 36009, 45060 ORLEANS Cédex, FRANCE

²GEOPS, Université Paris Sud, Bât 504, 91405 ORSAY, FRANCE

³ERAMET, 1 avenue Albert Einstein, 78190 Trappes, FRANCE

⁴Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Geologia, Universitat de Barcelona (UB), C/ Martí i Franquès, s/n -08028, Barcelona, SPAIN

*Corresponding author: n.maubec@brgm.fr

Nickel concentrations resulting from the weathering of ultrabasic rocks may lead to the formation of saprolitic ore where the garnierite may occur. This latter is mainly found in veins and fissures within the saprolite and can host 20 to 40 wt% Ni (Soler et al., 2008). Garnierite is characterized by a mixture of various nickel-bearing magnesium-phyllsilicates, such as serpentine, talc or sepiolite, which form a series of solid solution by Mg-Ni substitution (Gleeson et al., 2004).

In the context of the SOLSA project (www.solsa-mining.eu), which aims to develop an on-mine-on-line expert system for industrial applications by combining sonic drilling, chemical, mineralogical characterizations and data treatment, the analysis of nickel-rich phases (e.g. garnierite, smectite, serpentine) has been studied in view of their interests for nickel exploration in lateritic profiles.

Thus, in order to define characteristic signals of garnierite, a set of samples representative of the diversity of Ni-bearing clay minerals has been characterized using different analytical techniques, such as X-ray diffraction (XRD), Raman microspectroscopy, scanning electron microscopy (SEM) and electron probe micro-analysis (EPMA). The collected samples are Ni-bearing laterites from New Caledonia and the Dominican Republic. The results obtained show the effect of Ni on the position of certain X-ray diffraction peaks and/or Raman bands. The observed shifts between Ni-poor and Ni-rich phyllosilicate phases are characteristic of the substitution of Mg by Ni in octahedral sites and can be correlated to the amount of Ni (Cathelineau et al., 2015; Baron and Petit, 2016).

References:

Baron, F. and Petit, S. (2016). *Am. Min.* 101: 423

Cathelineau et al. (2015). *J. Raman. Spectrosc.* 46: 933

Gleeson, S.A., et al. (2004). *Econ. Geol.* 99: 1197

Soler, J.M., et al. (2008); Chem. Geol. 249: 191

The SOLSA consortium thanks the European Commission for having sponsored this project (SC5-11d-689868) in the H2020 program.