

VitroGeoWaste III

Immobilization of nickel on geikielite MgTiO₃ lattice: effect of mineralizers

Oral presentation / Poster presentation

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Abstract: Geikielite (MgTiO₃, S.G. R-3) belongs to the ilmenite (FeTiO₃) group (trigonal S.G. R3). The stability and crystallization of the Co-ilmenite (CoTiO₃) phase as a ceramic pigment is well known in the literature. Geikielite forms solid solutions with ilmenite (FeTiO₃) and pyrophanite (MnTiO₃), which are the final members of solid solutions by replacing iron (II) and manganese (II) with magnesium (1). Related to this system, the compounds Mg₂TiO₄ with spinel structure and MgTi₂O₅ with pseudobrookite structure are considered in the literature as entropy-stabilized structures: their relatively high entropy is associated with the mixing in specific crystallographic positions of different cations. This paper studies the immobilization by ceramization (2) of nickel in geikielite solid solution (Mg_{0.5}Ni_{0.5})TiO₃ and the effect of addition of three kinds of mineralizers in reference to the working temperature (1000 °C): lower temperature mineralizers (boric acid and sodium perborate), similar temperature mineralizer (NaF) or higher temperature mineralizer (mixture BaF₂.4MgF₂). The samples fired at 1000°C/3h prepared by the ceramic method have been studied regarding their color performance, leaching test of nickel and anions from the mineralizers addition, including the ecotoxicity test on *Vibrio fischeri*.

1. Garcia A., Galindo R., Gargori C, Cerro S., Llusar M., Monrós G., Ceramic pigments based on chromium doped alkaline earth titanates, *Ceramics International* 39,4(2013) 4125–4132, <http://dx.doi.org/10.1016/j.ceramint.2012.10.267>
2. C. Gargori, S. Cerro, N. Fas, M. Llusar, G. Monrós, Ceramization of heavy metals in (Ba_{1-X}M_x)Al₂Si₂O₈ solid solutions and recycling as pigments, *Materials Letters* 221 (2018) 187–191.