

Mineralogical and Petrographic study of magnesite and its host rocks at Mantoudi area of N. Euboea, Greece

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The present work deals with the mineralogical and petrographic study of Greek magnesite and its host rocks at the area of Mantoudi of N. Euboea of Greece which belongs to the Pelagonian Zone. The magnesite deposits of N. Euboea which are hosted by Alpine type ultramafic rocks are the major magnesite producing areas of Greece.

Greece is a EU country with a significant mineral resources background in terms of quality, quantity and variety of ores and minerals. The Greek Mining/Metallurgical Industry (GMMI) constitutes an important sector of the economic activity of the country as it supplies essential raw materials for primary industries and various downstream users. One of the abundance of ores is magnesite, which is used in several industrial applications as fertilizer, filler in rubber materials, in colour industries etc (Haben, 2002, Skliros, 2013). Nevertheless the main uses of magnesite are the production of caustic magnesia and other basic refractory materials. (Newman, 1997, Lampropoulou, 2003).

The last 100 years the intensive exploitation of magnesite ore of this area led to the significant reduce of the resources and simultaneous increase of the total cost of the production. The Greek industry should be remaining to the forefront of the developments. In this direction the continuous research for new industrial applications of magnesite and its products is demanded. Moreover the host rocks of magnesite (waste after exploitation) could be a new direction to their utilization contributing to the circular economy. Nowadays, TERNA MAG is a magnesite and magnesia producer, member of GEK TERNA GROUP, one of the leading business groups in Greece. It exploits the world-class magnesite deposits in the northern part of Euboea Island.

In this work, samples of magnesite and its host rocks collected from Gerorema and Babakas mining areas in order to be studied. They have been analysed by petrographic microscopy, X-ray Diffractometry (XRD) and Scanning Electron Microscopy with EDS system (SEM-EDS). Gerorema is the main metalliferous area where magnesite is mined in underground mining and characterized from high-purity, boron-free and low-iron, calcium and silicon impurities. (Gartzos, 1985). The results of the petrographic features, textures characteristics and mineralogical compositions are presented here.

According to the results magnesite of Gerorema area, characterized as microcrystalline to cryptocrystalline while sometimes veins of crystalline magnesite have been detected in peridotites (Figure 1). The host rocks of this area are ultramafic rocks of dunite, harzburgite, lherzolite as well as serpentinite. Through the polarizing microscope and the respective XRD pattern the pure cryptocrystalline magnesite rock (consisted of about 90% magnesite) is indicated in Figure 2.

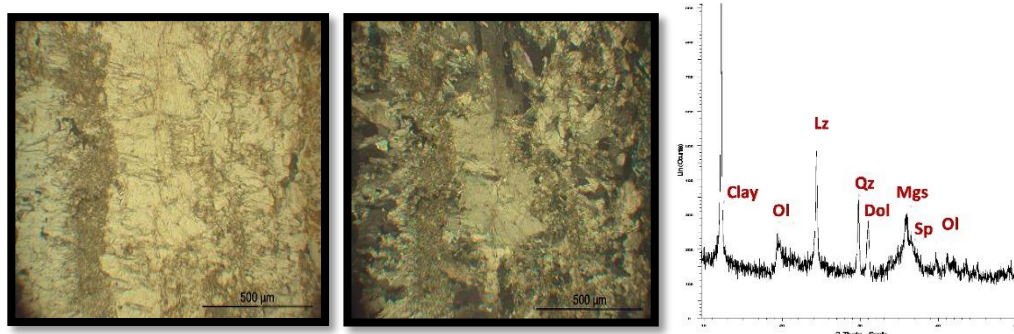


Figure 1. Petrographic microscopy analysis (parallel Nicols left and cross right) and respective XRD pattern of crystalline magnesite in the form of veins. Dol: dolomite; Lz: lizardite; Mgs: magnesite; Ol: olivine; Qz: quartz; Sp: spinel

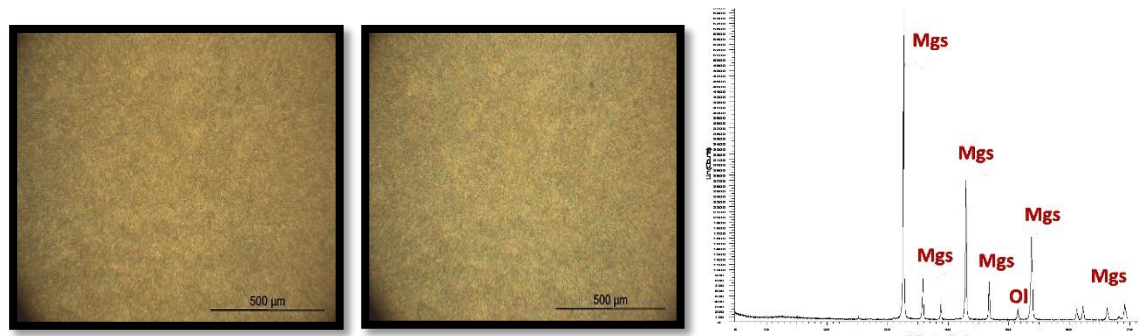


Figure 2. Petrographic microscopy analysis (parallel Nicols left and cross right) and respective XRD pattern of pure microcrystalline to cryptocrystalline magnesite. Mgs: magnesite; Ol: olivine

In case of Babakas area the results indicated that pure cryptocrystalline magnesite is hosted in ultramafic rocks, especially of serpentinized harzburgite. (Figure 3).

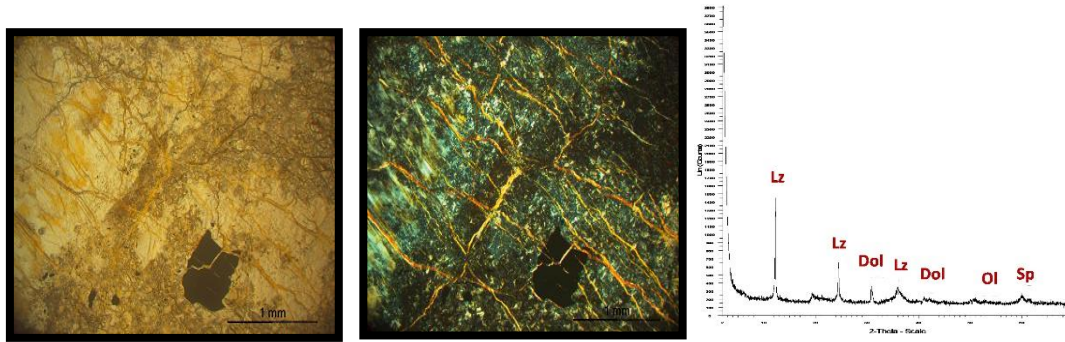


Figure 3. Petrographic microscopy analysis and respective XRD pattern of serpentinized harzburgite. Dol: dolomite; Lz: lizardite; Ol: olivine; Sp: spinel

This work introduced the idea of the synergy of these rocks, (without extensive enrichment) in several tested mixtures as raw materials for the production of new alternative low cost ceramics or aggregates, contributing further to the industrial development, save energy and economy.

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