

# CHARACTERIZATION OF HYDROTHERMALLY GROWN NANO-GYPSUM FOR INDUSTRIAL APPLICATIONS

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Brazil has one of the largest natural gypsum reserves in the world, the largest producer in South America and the 11<sup>th</sup> largest in the world, with a production of approximately 3.3 Mt/year. The main exploration deposits are located in the Araripe, in the Northeast of Country in the sedimentary basin, a region known as the Araripe Polo Gesseiro, due to the great industrial activity of gypsum extraction and gypsum production.

Industrial hemihydrate production is conducted using the dehydration process of gypsum using basically two industrial processes: (a) dehydration under atmospheric pressure to produce hemihydrate-beta, and (b) dehydration at high pressure to produce hemihydrate-alpha, which has higher mechanical properties such as higher density. According to a literature, it is expected that the mortar produced by nano-sized hemidrate shows higher hardness.

In this study, the obtained nano-gypsum from alpha-gypsum hydrothermal process growth and dehydration in hydrothermal solution (wet process) under pressure and in the presence of water vapor at temperatures above 120 ° C, were characterized it using advanced techniques of characterization of materials such as: high resolution X-ray diffraction, thermal analysis TG-DTA and infrared spectroscopy using the diffuse reflection method in infrared with Fourier transform – DRIFTS, scanning electron microscopy, thermal expansion analysis, BET dimensional analysis and hardness measurement. The nano-gypsum chracterization study results will be presented and discussed and industrial production will be also discussed.