

Surface Impurities on Giant Crystals of Naica: Structure, Origin and Evolution

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A few hundreds of miles south of Texas, in the Mexican state of Chihuahua, are Naica and its Giant Crystals Cave. The cave is known for its amazing gypsum crystals. Finding consistent explanations for the origin, evolution and appearance of giant crystals, as well as proposing recommendations for their preservation have scientific and social interest. This study is related to the impurities that obscure the surface of some of these crystals. The origin and evolution of the mentioned impurities are investigated by means of synchrotron light. Conventional laboratory techniques and synchrotron GI-XRD, μ -XRF and μ -XANES reveal that lead-manganese amorphous and iron matrices are the primary impurities on the crystals' surfaces. Secondary phases' composition matched with minerals from the main mineralization at the site. This work suggests that there are combined physico-mechanical and chemical weathering (hydration and oxidation) on the iron phases. Amorphous impurities tend to be dissolved and form new carbonates phases. The study concludes that the impurities have a natural origin. The human activity modifies the surface impurities.