Evidence of Screw Dislocation on Gypsum as Principal Mechanism of Growth at Low Supersaturation

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Gypsum mineral mainly occurs on evaporitic environment around the world [1, 2]. It has also been reported as a relevant phase in Mars [3-5]. The growth conditions during the growth of gypsum crystals influences the surface growth mechanisms and the habit. Many authors suggest that the growth mechanisms of gypsum crystals at low supersaturation is due to dislocation growth, these studies are based on kinetic data fitted to theoretical equations[6, 7]. However, the observation of hillocks on the surface gypsum crystals has been challenging. A couple of studies on the cleavage face (010) of gypsum by Atomic Force Microscopy (AFM) and Differential Interface Contrast Microscopy (DICM) shown some hillock but only one of them could be clearly identified as a screw dislocation, so the authors conclude that the main growth mechanism at low supersturation on this face is by 2D nucleation[8, 9]. Equivalent studies on the (120) face are missing, mainly due to the roughness of these faces. In a preliminary study of the gypsum (120) face using crystals growing by evaporation, we observed that hillocks spread on (120) at low supersaturation. Those hillocks are made by monolayers with a height of 4.30 Å corresponding to the d-spacing. These hillocks show an asymmetric morphology (figure 1).

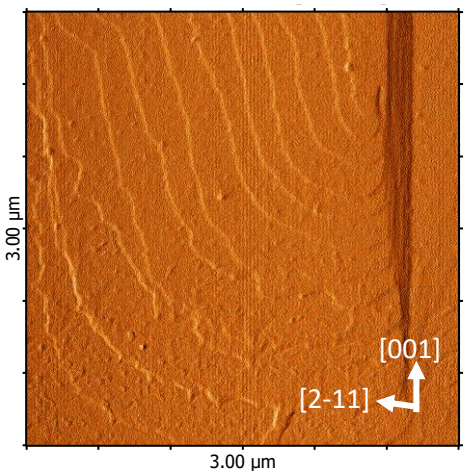

Figure 1: Hillock of a spiral growing on (120) face of gypsum crystal. Screw dislocation is the origin of the growth.

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