Pb-doped KCl: from adsorption to habit and crystal structure modification

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Many papers dealing with alkali-halides crystal morphology have been published since the Sixties. The relationship between crystal growth or dissolution morphology and the presence of surface specific impurities is commonly recognized. Authors usually attributed morphological changes to the random adsorption of the impurity on specific crystal surfaces. The results of our research clearly show that several morphological changes can be correctly interpreted in terms of 2D-epitaxially absorbed phases [1], [2] leading both to morphological and structural changes. In the case of potassium chloride crystals, both in-situ and ex-situ observations on growing and etched crystals were performed [3] in order to demonstrate that the appearance of the octahedron in the crystal morphology is due to the step bunching effect ascribable to the precipitation of PbCl2 crystallites along the n steps on the {100} forms. Inspired by the Lian et al. [3] detailed “morphodrome” showing the crystal habit and surface modifications of KCl crystals grown in the presence of Pb2+ as specific impurity, we performed a new series of growth and dissolution experiments in order to improve the old data. The impurity concentration ranges from 5 to 10000 ppm at constant crystallization temperature. Moreover we tried to enlarge the impurity concentration range, joining the molar ratio of the two known perovskite structures (KCl:PbCl2 and KCl2PbCl4) in order to evaluate the continuity between morphological and structural changes from the cell distortion (anomalous mixed crystal formation due to impurity adsorption and 2D epitaxy between KCl and PbCl2) to the symmetry breakdown (from the anomalous mixed crystal at higher symmetry to the perovskite structure at lower symmetry).


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