Influence of magnetic field on the growth mechanisms of sodium chlorate crystals

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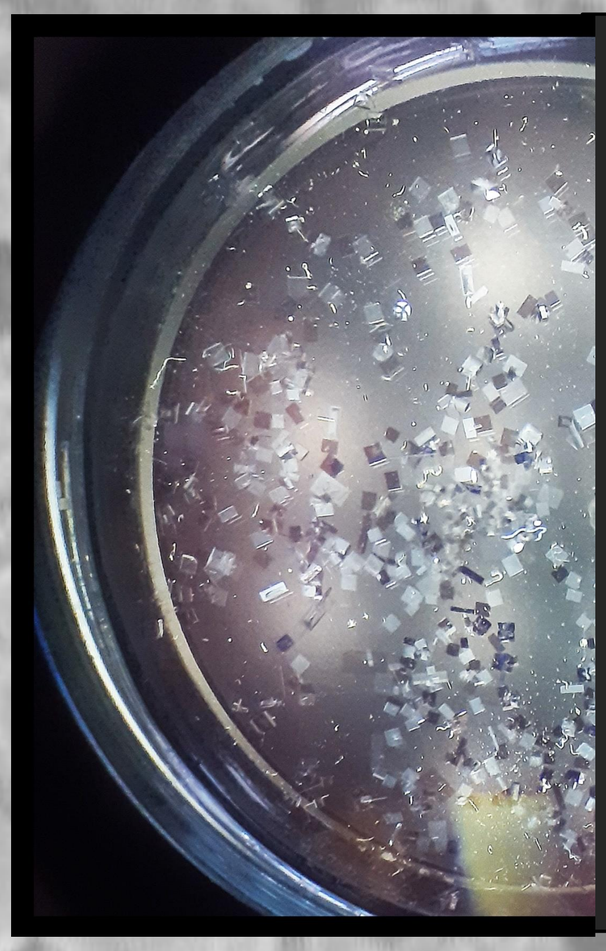
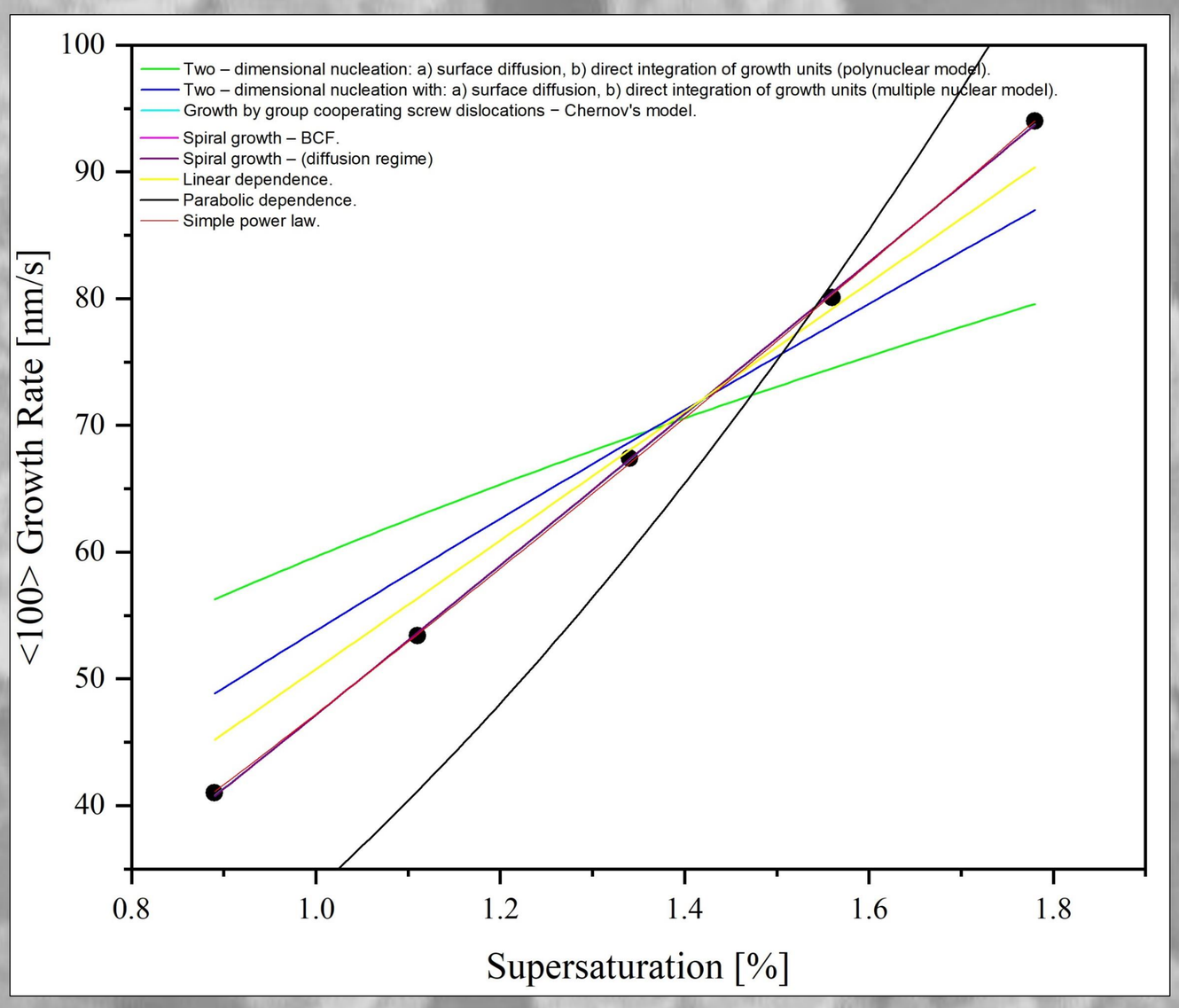
The mechanisms of crystal growth depend on the temperature and supersaturation of the solution. As a result of their competition, different growth regimes may occur.



To determine the possible influence of the static magnetic field on the growth mechanisms of sodium chlorate crystals, two groups of experiments were performed in the supersaturation range of 0.89 – 1.78%. In the first group, crystals were nucleated and grown under zero field conditions, while in the second group of experiments crystal growth was performed in the same supersaturation range, but at an applied magnetic field of (55±3) mT. The most common method for analyzing crystal growth mechanisms is to analyze the (R,σ) – dependence, where R is the growth rate in <100> direction and σ is the supersaturation of the solution.



Results of the analysis of the (R,σ) – dependence for crystals grown under zero field conditions show that the observed sodium chlorate crystals grew according to the spiral model of growth for diffusion regime, while the crystals grew in the magnetic field according to the power law $R \sim \sigma^n$. The goodness of fit was tested by the χ^2 – test.

Zero field

Eq.	χ_1	χ_2	χ_3	χ_4	χ_5	χ_6	χ_7	χ_8
	108.3	26.6	1.56	169	0.524	7.5	126.8	2.18 n=1.162

Applied magnetic field of (55±3) mT

Eq.	χ_1	χ_2	χ_3	χ_4	χ_5	χ_6	χ_7	χ_8
	141.1	36.2	0.104	185.9	0.176	10.16	139.5	0.079 n=1.193

Mitrovic, M. M., Maksimovic, B. Z., Vucetic, B. M., Milojevic, M. M., & Zekic, A. A. (2021). Coexistence of Different Growth Mechanisms of Sodium Chlorate under the Same Experimental Conditions. ACS omega, 6(34), 21909-21914.