suggest that the temperature may influence the nucleation and growth by changing the supersaturation level or by inducing liquid-liquid phase transitions [3].

In this study the effects of temperature in the nucleation and in the growth of crystals of different proteins were investigated. Protein crystals grown using batch technique over a temperature range from 277K to 297K were measured and counted. The preliminary results indicate that under the same crystallization conditions, a remarkable change in the number of crystals is observed when the crystallization temperature is modified. Dynamic Light Scattering experiments were performed for *in situ* determination of the size of aggregates during the crystallization process [4]. According to the fluctuation theory, the diffusion coefficient(s) of the sample solution can be obtained from the correlation times of the second order Auto Correlation Function (ACF) of the scattered light intensity. In this application, the ACF decays like the square of sum of exponentials [5] and the size distributions are determined using the Einstein-Stokes relation for diffusion when polydisperse aggregates are considered rigid spheres moving through the sample with low Reynolds number. Data analysis was performed using the program SEDFIT and according to the maximum entropy [6] the square of sum of two exponentials better adjust the data.

The results of DLS experiments indicated no temperature dependence of the growth rate of the scatters (crystals, nuclei) in the investigated temperature range. However, the scattered light intensity during the crystallization essays suffers a crucial change with temperature. Thus, temperature seems only to affect the crystallization process by altering the number of nuclei exceeding the critical size.

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Growth kinetics of the {100} face of potassium chloride crystals

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There are different kinds of particles (atoms, molecules, molecular clusters, etc) in the solutions but it is not known exactly what particles are the building units of the ion crystals. The work [1] suggests a theory which connects the growth rate with the Kossel or non-Kossel models of growth. So, the study of the dependence of the step velocity on supersaturation and other parameters may help to verify the models of ionic crystal growth.

The growth kinetics of the {100} faces of potassium chloride crystals was studied by atomic force microscopy (AFM) and Michelson laser interferometry.

Interferometric observations have shown that potassium chloride exhibits skeletal growth morphologies. Solution inclusions and segmented faces have appeared even at low supersaturation. The growth steps mostly came from the edges and quickly gained domination over growth hillocks on the face. At higher supersaturations of solution the growth hillocks appeared on the face, as well, but they often overlapped.

According to [2] the growth rate of potassium chloride decreases in the presence of lead chloride. Also $PbCl_2$ additive makes more stable the {100} faces of KCL crystal, preventing them from segmentation, and stimulates the appearance of growth centers on the surface.

Lower growth rates of the {100} faces in $PbCl_2$ doped solution allowed in situ study of surface crystallization processes by AFM. These experiments showed that lead chloride influenced significantly surface morphology of potassium chloride crystals.

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Crystal growth using low temperature gradient sublimation

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Many organic compounds are known to exist in different crystalline forms both as polymorphs and solvates [1]. Since processing steps in pharmaceutical industry raise many opportunities for phase transformations or solvate formation which may affect their physico-chemical properties it is important to be able to obtain pure crystalline forms.

A method for growing high quality single crystals in the gas phase has been developed. The combination of low (and very low) temperature gradients with vacuum sublimation has several important advantages over other crystallization techniques. Sublimation (which is also a purification technique) can give good quality single crystals in few hours without the necessity of using solvents. The crystalline form and morphology of crystals grown from gas phase are far less affected by solvents and impurities than crystals grown from solution.

The method has been successfully applied to several different classes of compounds. These include systems which exhibit polymorphism, pseudo-polymorphism (sulfathiazole, carbamazepine), have difficulties with crystal packing (stanozolol and ethinyl estradiol [2]) or have problematic morphologies when grown from solution (4-hydroxy-N-phenyl-benzenesulfonamide).

All compounds were analyzed using single crystal X-Ray diffraction, X-Ray powder diffraction, FT-IR spectroscopy and differential scanning calorimetry.

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Effect of cooling rate on thermal crystallization of energetic materials

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