**s8b.m5.o5** **Surface Processes and Growth Kinetics in the Crystallization of Virus and Protein Crystals.** A.J. Malkin, Yu.G. Kuznetsov, A. McPherson. *Department of Molecular Biology and Biochemistry, University of California, Irvine, CA 92697, USA.*
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*In situ* Atomic Force Microscopy (AFM) revealed that growth of single crystals of turnip yellow mosaic virus (TYMV) cucumber mosaic virus (CMV) and glucose isomerase proceeded strictly by two-dimensional (2D) nucleation.

For glucose isomerase, from supersaturation dependencies of tangential step rates and critical step length, the kinetic coefficients of the steps and the surface free energy of the step edge were calculated to be 5.2 x $10^{-4}$ cm/sec and 0.4 erg/$cm^2$ respectively. Supersaturation dependence of the rate of two-dimensional nucleation was measured and found to be strongly dependent upon precipitant concentrations.

The molecular structure of the step edges, defect formation, the adsorption of individual virus particles and their aggregates, and the initial stages of formation of 2D nuclei on the surfaces of TYMV and CMV crystals were recorded. Step advancement proceeded through one-dimensional nucleation. For CMV crystallization attachment rates of individual virions into the growth step were measured at different supersaturations. No detachment was observed even at conditions close to equilibrium.

For the first time capsomere structure of a virus (TYMV) was directly visualized by AFM.with hexameric and pentameric capsomers of the T=3 capsids being clearly discriminated from one another Restructuring of the TYMV crystalline surface was observed. This transformation was highly cooperative in nature and readily explicable in terms of an organized loss of classes of virus particles from specific lattice positions[1].

*Notes*

[1] Malkin, A.J., Kuznetsov, Yu.G., Lucas, R.W. and McPherson, A. « Surface processes in the crystallization of turnip yellow mosaic virus visualized by atomic force microscopy » Journal of Structural Biology (1999) 127, 35-43.