MS16.02.06 IN SITU STM STUDY OF THE GE ON SI MOLECULAR BEAM EPITAXY. Bert Voigtlander, Institut fur Grenzflächenforschung und Vakuumphysik Forschungszentrum Jülich, 52425 Jülich, Germany

A high temperature scanning tunneling microscope (STM) capable of imaging during MBE-growth is described. We studied the epitaxial growth of Germanium on Silicon at 600 - 900 K sample temperature "in situ". This technique gives access to the dynamics of the growth process on an atomic scale. The potential of the method is demonstrated by the following results:

The layer-by-layer growth of the two-dimensional Stranski-Krastanov layer of Ge on Si(111) and the formation of three-dimensional islands during further growth of Ge was observed. An inversion of the aspect ratio of the islands with increasing coverage indicates a transition from coherent to dislocated islands.

The transition from initial multilayer to pure layer-by-layer growth was imaged in Si(111) homoepitaxy.

In Si(111) homoepitaxy growth was observed along stripes of the width of a (7x7) unit cell. Upon coalescence of islands new growth facets with different growth speeds are observed.

Some of the results will be presented on videotape. This method (MBSTM) opens the possibility to follow MBE growth processes dynamically on a nanometer scale and gives access to the evolution of specific features during growth.

PS16.02.07 MECHANISMS OF STRIATION FORMATION DURING GROWTH OF KDP FAMILY CRYSTALS. I.L. Smolsky, A.E. Voloshin, E.B. Rudneva, Institute of Crystallography of Russian Academy of Sciences

Usually the striations are considered as a result of inhomogeneous impurity distribution along the growth front due to nonconstancy in the growth conditions (supersaturation, temperature of growth etc.). But there are some other reasons related with interior defect structure of crystals or/and surface morphology of the growing faces. In KDP group crystals the growth steps covering faces of the crystal form vicinal hillocks at outcrop points of dislocations or dislocation bunches. It was established [1] that lattice parameters of the crystal depend on growth steps orientation. We are going to discuss:

1.The formation of striations as a result of modification of activity of dislocation steps sources.

2. The striations formation during the steps bunching and macrosteps formation. This process is more active at lower temperatures of crystallization.

3. The striations in rapidly growing crystals in comparison with traditionally grown crystals. This technique uses high level of supersaturation and active stirring of solution.

4. Quantitative X-ray topographic technique for measurements of lattice parameter variations related with striations and homogeneity of crystals.

[1] I.L.Smolsky, N.P.Zaitseva, in:"Growth of Crystals", v.19, ed. by E.I.Givargizov and S.A.Grinberg, Plenum Publ. Corp., N.Y., 1995, p. 173-185.

PS16.02.08 PERIODIC ROUGHENING AND FACETING GROWTH IN TWO-DIMENSIONS. Xiao-Yong Liu, Mu Wang, and Nai-Ben Ming, National Laboratory of Solid State Microstructures, Nanjing University, Nanjing 210093 & Center for Advanced Studies of Science and Technology of Microstructures, Nanjing 210093, China

In two-dimensional solution growth system we discovered a novel growth behavior of crystals that roughening and faceting appeared periodically on a crystal branch. The microscopic morphology of the crystal surface in these two regions were examined respectively by AFM and differential interference contrast microscopy. The spatial distance of the neighboring faceting regions was measured as a function of the concentration of impurity in solution. The concentration of impurities trapped in roughened region and faceted region was detected by absorption infrared spectra. We found that the amount of impurity in the roughened region was much higher than that in the faceted region. An interpretation is given to this phenomenon based on our experimental observations.

PS16.02.09 CRYSTALLIZATION RATE MINIMA IN ULTRA-LONG n-ALKANES. E.Boda, G. Ungar, Department of Engineering Materials, University of Sheffield, Sheffield S1 3JD, UK, A. Keller, H.H.Wills Physics laboratory, University of Bristol, Bristol, BS8 1TL, UK

Crystallisation studies were carried out on monodisperse ultra-long chain n-alkanes which were shown to form chain-folded structures [1]. One of the most intriguing observations is the occurrence of a minimum in crystal growth rate as a function of temperature which was found for $C_{198}H_{398}$, $C_{246}H_{494}$ and $C_{294}H_{590}$. This effect was observed for solution crystallisation as well as for crystallisation from the melt. Real-time small angle X-ray (SAXS) experiments revealed a transition between an extended-chain and folded-chain crystallisation at the temperature where the minimum occured.

The "self-poisoning" mechanism was proposed as an explanation of the observed retardation in crystallisation rate with increasing supercooling. According to this model, folded chain depositions occur more frequently than extended-chain ones and block the growing face of a polymer crystal.

Isothermal DSC melt-crystallisation studies of $C_{246}H_{494}$ and $C_{294}H_{590}$ will be presented, together with the results of combined real-time synchrotron SAXS/WAXS experiments.

1. G.Ungar, J.Stejny, A.Keller, I.Bidd, M.C.Whiting, Science, 1985, v.229, pp. 386-389.
2. Ungar, G., "Integration of fundamental Polymer Science and Technology", 1988, 2, 342.