Abstract Submitted
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Ordering mechanisms of periodic stripe arrays on boron-doped Si(100)[1] IVAN ERMANOSKI, GARY KELLOGG, NORMAN BARTELT, Sandia National Laboratories — We have used low energy electron microscopy to determine the factors that control the degree of order in self-assembled periodic stripe arrays on the atomically flat Si(100) with high boron doping. The stripes consist of extremely elongated vacancy islands of single atomic height, formed at ∼900C, confined in micrometer-sized pits. "Perfect" arrays of parallel stripes (in pits of up to ∼10um in size) were formed by allowing various defects to heal over relatively long periods of time. Sublimation was compensated for by an external Si doser, allowing observation of stripe evolution over the course of hours, with no net loss or gain of Si from the area of interest. Stripe formation and ordering mechanisms include spontaneous nucleation and growth of new islands, longitudinal splitting, as well as coarsening due to surface diffusion. Stripe periodicity depends on temperature, allowing for control of this property. Stripes are stable in a range of ∼100C, outside of which they assume the familiar shape of elongated islands, shaped by the anisotropy in step energy. Stripe order can be preserved to room temperature by quenching. References: [1] J.-F. Nielsen et al., Appl. Phys. Lett. 79 (2001) 3857

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Ivan Ermanoski
Sandia National Laboratories

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