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Controlling the periodicity of the Si(112)nx1-Ga surface via tuning of the chemical potential E.J. MOON, University of Tennessee, Knoxville, USA, P.C. SNIJDERS, Kavli Institute of Nanoscience, Delft, The Netherlands, S. ROGGE, Kavli Institute of Nanoscience, Delft, The Netherlands, H.H. WEITERING, University of Tennessee, Knoxville, and Oak Ridge National Laboratory —
We show that the chemical potential, an important parameter in the initial stages of (hetero-) epitaxial semiconductor growth, can be tuned for the Ga atoms on the Si(112)nx1-Ga surface. As a result the periodicity of the surface can be controlled in the range of n=5 to n=6. STM shows that meandering vacancy lines determine the local size of the unit cell. Large scale statistics of the unit cell size extracted from STM images show that the average periodicity n is not an integer, but lies somewhere in between 5 and 6. These findings are confirmed by a careful analysis of new LEED data, which show a range of periodicities in between 5x1 and 6x1 depending on the surface preparation conditions. The extracted periodicities are consistent with periodicities extracted from Fourier Transform STM images. Thus, changes of the chemical potential of the Ga atoms on the surface can be easily monitored in situe by extracting the average surface periodicity from LEED images.

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