

Abstract Submitted
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Unusual “Explosive” Nucleation and Superdiffusion in Pb/Si(111)-7x7¹ M. T. HERSHBERGER, Iowa State University and Ames Laboratory, M. HUPALO, Ames Laboratory, P. A. THIEL, Iowa State University and Ames Laboratory, H. HATTAB, Ames Laboratory, M. HORN VON HOEGEN, University of Duisburg-Essen, M. C. TRINGIDES, Iowa State University and Ames Laboratory — The study of the recently found “explosive” nucleation on Pb/Si(111) was further investigated to understand the origin of the sharp transition in coverage and the presence of superdiffusive motion. After small stepwise depositions of ~ 0.03 ML spatial correlations in the growth direction of neighboring islands are observed. The island growth rates are much higher than what is expected in classical nucleation. Islands collect material many times larger than the amount deposited in the surrounding Voronoi areas contrary to classical expectations. Their centers of mass shift by large amounts, ~ 10 nm, again confirming the directionality in their growth and that material must be arriving over mesoscale distances. The island size distributions do not agree with the expected sharply peaked classical distributions since only fully completed islands are observed. Further depositions show additional nucleation of smaller islands and with higher densities thus conforming that when the critical coverage is reached locally the island nucleation is still active. Comparisons will be made between the diffusion length deduced in these experiments and the one extracted from earlier LEEM experiments monitoring the refilling of an initial vacant area.

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