Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Surface Freezing in Liquid Gold-Silicon Eutectic Alloy investigated with Surface X-ray Diffraction REINHARD STREITEL, OLEG SHPYRKO[1], ALEXEI GRIGORIEV[2], VENKAT BALAGURUSAMY, PETER PERSHAN, Harvard University, BEN OCKO COLLABORATION[3], MOSHE DEUTSCH COLLABORATION[4] — The formation of a 2D AuSi crystalline lattice on top of liquid AuSi eutectic alloy was found in surface X-ray diffraction experiments. Up to 12 degree above bulk melting temperature ($T_{melt} = 361°$C) we observe a powder like, 2D crystalline lattice. Increasing the temperature we find a first order phase transition. GID diffraction data was used to determine the 2D lattice parameters and the domain size was estimated to be larger than 0.9 μm. Normalized X-ray reflectivity shows an increase of a factor of 20 in comparison to classical systems, indicating that atomic layering normal to the surface is significantly enhanced for AuSi. Synchrotron measurements were performed at ChemMatCARS, Advanced Photon Source, Argonne National Lab and supported by DOE grants DE-FG02-88-ER45379 and DE-AC02-98CH10886.

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Date submitted: 12 Jan 2006 Electronic form version 1.4