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Sapphire Surface Polymorphs and The Growth of Pb Overlayers
HAWOONG HONG, Frederick Seitz Matrials Research Laboratory, University of Illinois, Urbana-Champaign, AARON GRAY, Department of Physics and Frederick Seitz Matrials Research Laboratory, University of Illinois, Urbana-Champaign, T.-C. CHIANG, Department of Physics and Frederick Seitz Matrials Research Laboratory, University of Illinois, Urbana-Champiagn — The surface structure of sapphire (α-alumina) is an issue of long-standing interest, both scientifically and technologically. Molecular dynamics simulations showed the γ-alumina structure to have a lower energy than that of α-alumina [1], thus suggesting a possibly modified surface structure when sapphire is treated at high temperatures. We have performed x-ray reflectivity measurements at the Advanced Photon Source to address this issue. Standard sapphire substrates were prepared by furnace annealing at 1600° C in air. The resulting surfaces showed large terraces with straight step edges. The substrates were then annealed in a UHV chamber at increasingly higher temperatures. Many new features emerged in the reflectivity curves, which could be attributed to various transition alumina structures, including the θ'-, δ-, and θ- polymorphs [2]. Pb films were grown on these surfaces. The resulting structure and morphology was characterized. This talk will summarize our findings. [1] S. Blonski and S. H. Garofalini, Surf. Sci. **295**, 263 (1993). [2] I. Levin and D. Brandon, J. Am. Ceram. Soc. **81**, 1995 (1998).

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