Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Structural and dynamical studies of the $LaAlO_3/SrTiO_3$ interface X. WANG, G. YOU, Q-H. XU, M. MOTAPOTHULA, M. B. H. BREESE, T. VENKATESAN, A. ARIANDO, NanoCore, National University of Singapore, J. HUIJBEN, H. HILGENKAMP, University of Twente — Oxide thin-film heterostructures offer unique opportunities for combining materials with various functionalities, providing a versatile pathway to create novel oxide electronic devices. In particular, studies have recently shown high-mobility conducting planes emerge at the interface between insulating oxides of $LaAlO_3$ and $SrTiO_3$. To fully understand the mechanisms underlying the interface characteristics, and to identify ways to optimize them for device applications, detailed investigations on the structural and electronic properties with all currently available techniques are being pursued. Rutherford backscattering (RBS) is a powerful technique for studying interface composition and interface roughness, which could shed light on the important aspects, such as oxygen vacancies and inter-diffusion in these systems. We present recent RBS studies combined with XRD. Furthermore the real-time dynamical studies of charge carriers out of equilibrium can give detailed microscopic information about electronic correlations at these interfaces, which can be probed with time-resolved optical spectroscopy on a sub-picosecond time scale. We will discuss our experiments using femtosecond laser pulses to investigate the real-time charge dynamics of in the $LaAlO_3/SrTiO_3$ interfaces.

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Date submitted: 20 Nov 2009 Electronic form version 1.4