

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Superconducting Interfaces between Artificially-Grown LaAlO₃ and SrTiO₃ Thin Films DANFENG LI, STEFANO GARIGLIO, CLAUDIA CANCELLIERI, ALEXANDRE FETE, DANIELA STORNAIUOLO, JEAN-MARC TRISCONI, DPMC, University of Geneva, 24 Quai Ernest Ansermet, 1211 Geneva, Switzerland, PROF. J.-M. TRISCONI'S GROUP TEAM — Realization of a fully metallic two-dimensional electron gas (2DEG) at the interface between artificially-grown LaAlO₃ and SrTiO₃ thin films has been an exciting challenge. Here we present for the first time the successful realization of a superconducting 2DEG at interfaces between artificially-grown LaAlO₃ and SrTiO₃ thin films. Our results highlight the importance of two factors - the growth temperature and the SrTiO₃ termination. We use local friction force microscopy and transport measurements to determine that in normal growth conditions the absence of a robust metallic state at low temperature in the artificially-grown LaAlO₃/SrTiO₃ interface is due to the nanoscale SrO segregation occurring on the SrTiO₃ film surface during the growth and the associated defects in the SrTiO₃ film. By adopting an extremely high SrTiO₃ growth temperature, we demonstrate a way to realize metallic, down to the lowest temperature, and superconducting 2DEG at interfaces between LaAlO₃ layers and artificially-grown SrTiO₃ thin films. This study paves the way to the realization of functional LaAlO₃/SrTiO₃ superlattices and/or artificial LaAlO₃/SrTiO₃ interfaces on other substrates.

Danfeng Li
DPMC, University of Geneva, 24 Quai Ernest Ansermet,
1211 Geneva, Switzerland

Date submitted: 15 Nov 2013

Electronic form version 1.4