ON THE ROAD TO RTS

(ONE ATOMIC LAYER AT A TIME)

Ivan Bozovic

Brookhaven National Laboratory, Upton NY 11973, USA

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1. MBE system and technique

Molecular Beam Epitaxy Group

Condensed Matter Physics and Materials Science Department, BNL

Ivan Bozovic
Group Leader

Gennady Logvenov
Scientist

Vladimir Butko
Associate Scientist

Adrian Gozar
Goldhaber Fellow

Anthony Bollinger
Postdoc

"Adjoint": P. Chaudhari, H-J. Shim (BNL)

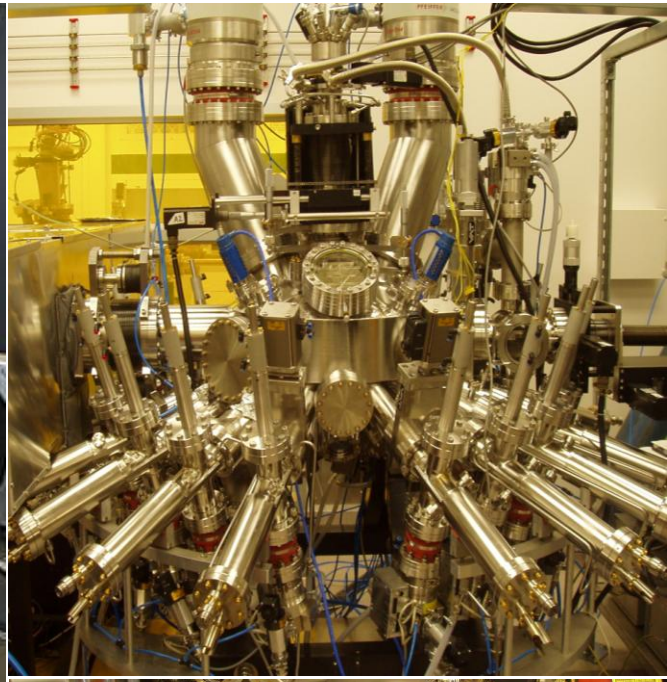
Visiting scientists and students

Professor Catherine Deville-Cavelin, Université Paris 12, France	06.01.06 – 08.31.06
Professor Jeffrey Clayhold, Miami Univ., Ohio	07.10.06 – 08.15.06
Jiwon Seo, grad. student, Cambridge Univ., England	05.31.06 – 07.29.06
Scott Riggs, grad. student, Florida State Univ., Tallahassee, FL	05.31.06 – 06.15.06
Dr. Miodrag Kulic, MPI Dresden, Germany	08.15.06 – 09.31.06
Ludovic Howald, grad. student, EPFL, Switzerland	08.31.06 – 01.31.07
Professor Zoran Radovic, FF-Beograd, Serbia	10.01.06 – 01.31.07

Collaboration

• COBRA	R. Pindak (BNL), Y. Yacobi (Israel)
• Surface crystallography	S. Wilkins, J. Hill (BNL)
• Transmission electron microscopy	Y. Zhu, J. He (BNL)
• X-ray scattering simulations	J. Misewich (BNL), N. Bozovic (SJSU)
• In-situ STS and ARPES	J. C. Davis (Cornell & BNL), T. Valla (BNL)
• Ultrafast pump - diffraction probe	A. Zewail, N. Gedik (Caltech)
• Resonant X-ray Scattering	S. Smadici, P. Abbamonte (Urbana)
• Implanted junctions	R. Dynes, S. Cybart (Berkeley)
• Slow-muon spin resonance	E. Morenzoni, A. Suter (PSI - Zurich)
• High magnetic field	G. Boebinger (NHMFL), F. Balakirev (LANL)
• Femtosecond pump-probe	J. Demsar (Konstanz)
• Optics in high magnetic field	S. Djordjevic (Akron U.)
• FEST spectroscopy	R. Ashoori (MIT)
• COMBI Hall effect	J. Clayhold (Miami U.)
• Noise measurements	D. Popovic (NHFML),
• Magnetoresistance	C. Panagopoulos (Cambridge)
• Magneto-optic imaging	Y. Yeshurun (Tel Aviv U.)

ALL-MBE SYSTEM AT BNL



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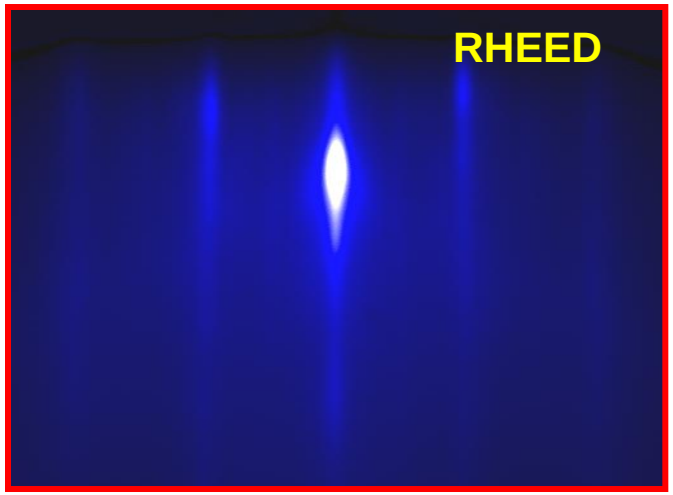
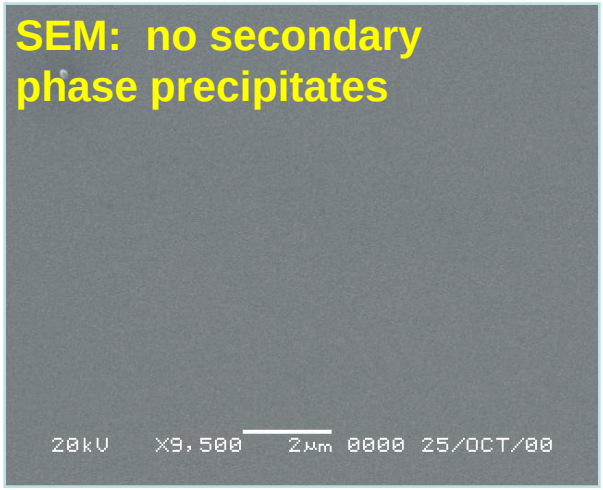
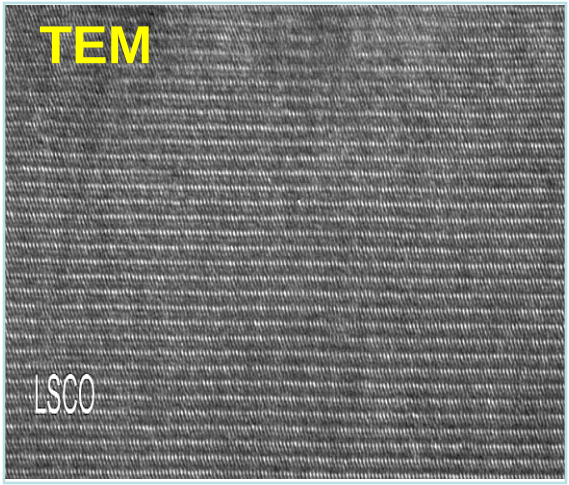
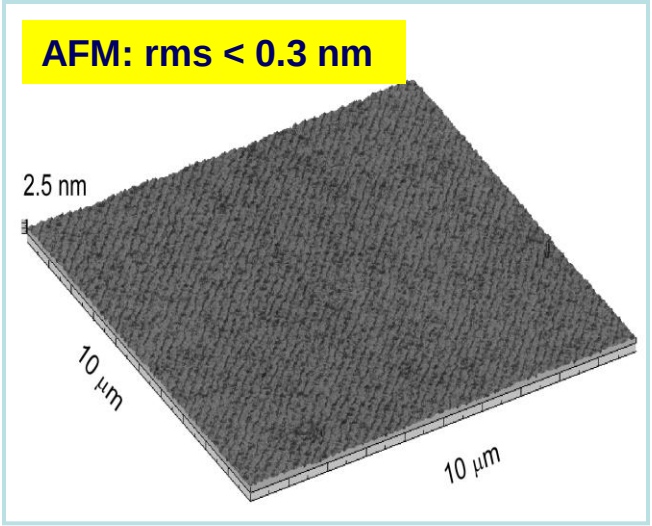
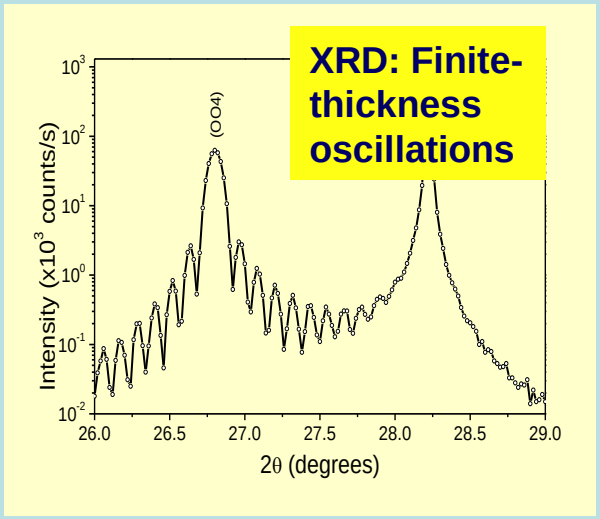
ATOMICALLY SMOOTH CUPRATE FILMS GROWN BY MBE

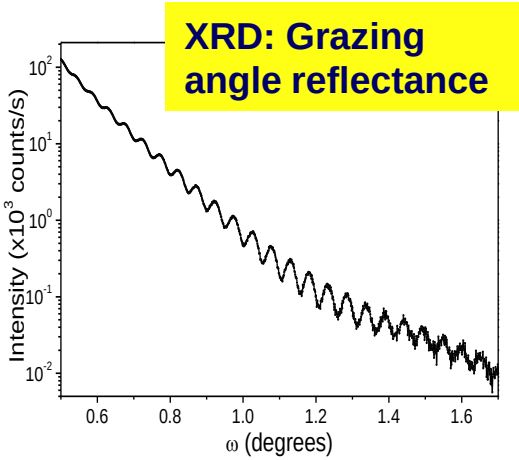












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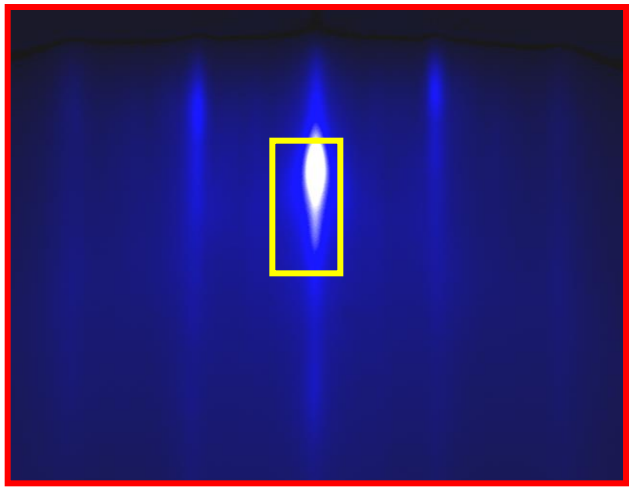
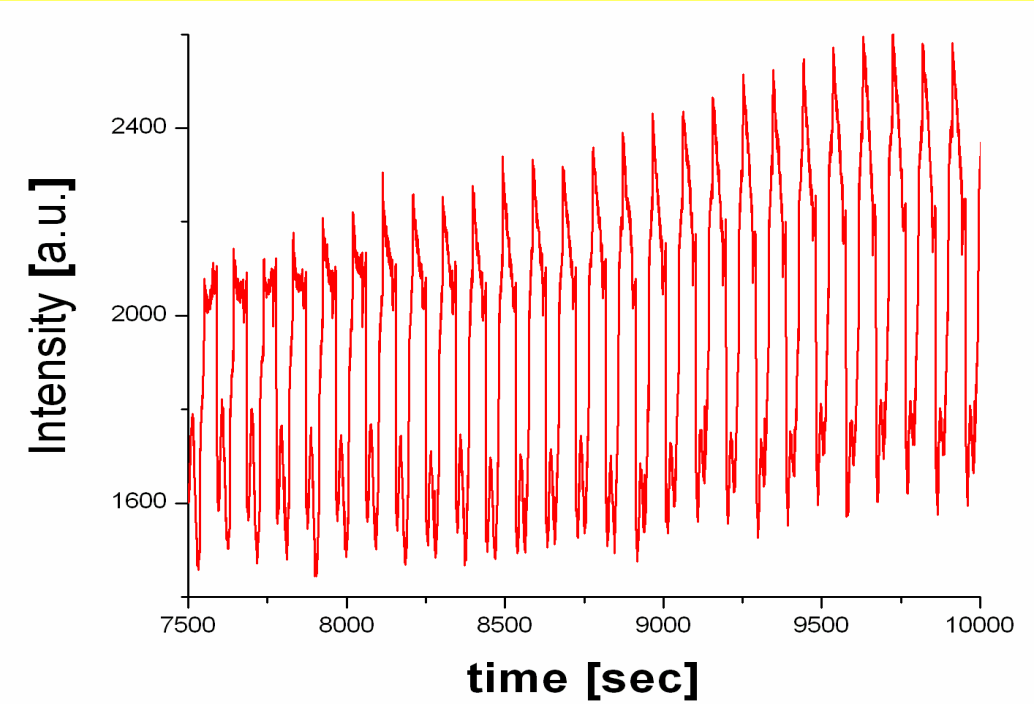
LaSrCuO film on $LaSrAlO_4$ substrate

RHEED oscillations provide *real-time, in-situ* information on surface roughness





Intensity drops to minimum when half of atomic layer is deposited, and rises back to maximum when that layer is completed.

Constant maximum intensity indicates that the surface roughness is not increasing with thickness.

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⇒ DIGITAL THICKNESS CONTROL!