

**Name:** Mauro R. Sardela, Jr.

**Research fields of interest and experience:**

- General materials characterization and device processing.
- Thin film growth. Nano and soft materials.
- X-ray scattering methods.
- Surface analysis.

My research experience and interests cover several fields of materials fabrication and characterization. I have been involved in the growth and characterization of various thin film and multilayer systems including epitaxial heterostructures (III-V and group IV semiconductors, such as InGaAs, GaN, AlGaIn, SiGe, SiSn, etc.), nitrides (TiN, CrN, etc.), oxides (SiO<sub>x</sub>, STO, LMO, etc.), and metals (Cr, Ni, Co and related silicides) by various growth techniques including MBE, PLD, ALD, sputtering, etc. I have also been involved in the fabrication of nanomaterials (nanoparticles such as Fe oxides and Au), soft materials and bio materials, including a recent project on microstructural changes of wood under fungi attack and deterioration. I have considerable hands-on experience on all x-ray analysis techniques with a focus on diffraction and scattering methods, applied to materials systems ranging from steel, metals, superlattices, superconducting structures, oxides, and nitrides, to soft/bio materials (polymers, lipids, proteins, etc.). I have also been involved in surface analytical methods including SIMS, XPS and Auger electron spectroscopy, spanning years of commercial analytical work in a corporate environment. I am particularly fascinated by multi-technique characterization methods and issues involving technique development and cross-technique comparison.

**Instrumentation/core of responsibility within the MRL:**

-X-ray analysis (powder, thin films, bulk, small angle x-ray scattering, etc.)

**Other instruments qualified to operate:**

-ellipsometry; profilometry; SIMS; Auger electron spectroscopy

**Education:**

Universidade de Brasilia, Brasilia, Brazil	Physics	B.Sc. (1985)
Universidade de São Paulo, S. Paulo, Brazil	Physics	M.Sc. (1987)
Linköping University, Linköping, Sweden	Materials Science	Ph.D. (1994)

**Appointments (Professional experience):**

2015 - present	Director, Central Research Facilities, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
2015 - present	Affiliated, Center for Latin American and Caribbean Studies, University of Illinois, Urbana, IL
2014 – present	Affiliated, The Lemann Institute for Brazilian Studies, University of Illinois, Urbana, IL
2012 – 2015	Senior Research Scientist, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
1998 – 2012	Research Scientist, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
1996 – 1998	Principal Analyst, Charles Evans & Associates, Sunnyvale, CA
1994 – 1996	Research Scientist, Materials Science and Engineering, University of Illinois, Urbana, IL

**Awards (if applicable):**

2016 American Vacuum Society Award for Excellence in Leadership

2015 grant from the UIUC Lemann Institute: “Natural biocides and heat treatment on Brazilian tropical woods: changes in crystallinity after fungal decay” with Prof. Leal (UIUC MATSE) and Prof. Goncalves (USP, Brazil).

**Selected publications (if applicable):**

- “Epitaxial growth of three dimensionally structured III-V photonic crystal via hydride vapor phase epitaxy”, Q. Zheng, H. Kim, R. Zhang, M. Sardela, J.-M. Zuo, B. Manavaimaran, S. Lourduoss, Y.-T. Sun and P.V. Braun, *Journal of Applied Physics*, **118**, 224303 (2015).

- “Practical Materials Characterization”, ed. M. Sardela, Springer, New York (2014), ISBN: 978-1-4614-9280-1.
- “Large area and depth-profiling dislocation imaging and strain analysis in Si/SiGe/Si heterostructures”, X. Chen, D. Zuo, S. Kim, J. Mabon, M. Sardela, J. G. Wen and J-M. Zuo, *Microscopy and Microanalysis*, **20**, 1521-1527 (2014).
- A.F. N. de Azeredo, A.M.P. Carneiro, G.A. de Azerêdo and M. Sardela, “Hardened Properties of Lime Based Mortars Produced from Kaolin Wastes”, *Key Engineering Materials*, **600**, 282-296 (2014).
- I. Hussainova, I. Jasiuk, M. Sardela and M. Antonov , “Micromechanical properties and erosive wear performance of chromium carbide based cermets”, *Wear* **267**, 152-159 (2009).
- C.H. Lei, J.G. Wen, M. Sardela, J. Bareno, I. Petrov, S.-H. Kang and D.P. Abraham, “Structural study of  $\text{Li}_2\text{MnO}_3$  by electron microscopy”, *Journal of Materials Sciences* **44**, 5579-5587 (2009).
- B. Howe, J. Bareno, M. Sardela, J.G. Wen, J.E. Greene, L. Hultman, A.A. Voevodin, and I. Petrov , “Growth and physical properties of epitaxial metastable  $\text{Hf}_{1-x}\text{Al}_x\text{N}$  alloys deposited on  $\text{MgO}(001)$  by ultrahigh vacuum reactive magnetron sputtering”, *Surface & Coating Technol.* **202**, 809-814 (2007).
- C.H. Jang, M.R. Sardela Jr., S.-H. Kim, Y.-J. Song and N.-E. Lee, “Strain relaxation of epitaxial SiGe layer and Ge diffusion during Ni silicidation on cap-Si/SiGe/Si(001)”, *Applied Surface Science* **252**, 5326-5330 (2006).