

Name: Timothy Spila

Research fields of interest and experience:

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

My research interests involve the creation and characterization of hard materials, including semiconductor and superconductor thin films, lithium ion battery materials, and hard materials for wear analysis. My previous research experience has involved the growth of epitaxial Si_{1-x}Ge_x/Si thin films grown by gas-source molecular beam epitaxy and their characterization by atomic force microscopy, x-ray diffraction, and x-ray reflectivity. I also have significant experience in the analysis of materials by secondary ion mass spectrometry, which includes the analysis of samples ranging from biological cells, to surface coatings used to decrease friction on steel, to dopant depth profiles in semiconductor samples. I am particularly interested in projects dealing with the effect of surface morphology on other material properties.

Instrumentation/core of responsibility within the MRL:

- Secondary Ion Mass Spectrometry (magnetic sector and Time-of-Flight)
- Thermogravimetric analysis

Other instruments qualified to operate:

- Dynamic Mechanical Analysis
- Nano-indentation
- Profilometry
- X-ray analysis (thin films, reflectivity)

Education:

Pennsylvania State University	Engineering Science	B.S. (1992)
University of Illinois	Materials Science and Engineering	Ph.D. (2001)

Appointments (Professional experience):

2012 – present	Senior Research Scientist, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
2004 – 2012	Research Scientist, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
2010 – 2011 and 2015	Interim Director MRL Central Research Facilities, Frederick Seitz Materials Research Laboratory, University of Illinois, Urbana, IL
2002 – 2004	Post-doctoral Researcher/Visiting Lecturer, Materials Science and Engineering, University of Illinois, Urbana, IL
1992 – 2002	Graduate Research Assistant, Materials Science and Engineering, University of Illinois, Urbana, IL
1998	Silicon Research Consortium Engineering Intern, Motorola

Selected publications (if applicable):

- J. Chang, R.T. Haasch, J. Kim, T. Spila, P.V. Braun, A.A. Gewirth, and R.G. Nuzzo, “Synergetic role of Li⁺ during Mg electrodeposition/dissolution in borohydride diglyme electrolyte solution: voltammetric stripping

behaviors on a Pt microelectrode indicative of Mg–Li alloying and facilitated dissolution.” *ACS Appl. Mater. Interfaces* **7**, 2494 (2015).

- J.S. Sadhu, H. Tian, T. Spila, J. Kim, B. Azeredo, P. Ferreira, and S. Sinha, “Controllable doping and wrap-around contacts to electrolessly etched silicon nanowire arrays.” *Nanotechnology* **25**, 375701 (2014).
- M. Bettge, Y. Li, B. Sankaran, N.D. Rago, T. Spila, R.T. Haasch, I. Petrov, D.P. Abraham, “Improving high-capacity $\text{Li}_{1.2}\text{Ni}_{0.15}\text{Mn}_{0.55}\text{Co}_{0.1}\text{O}_2$ -based lithium-ion cells by modifying the positive electrode with alumina.” *J. Power Sources* **233**, 346-357 (2013).
- K.A. Bratland, T. Spila, D.G. Cahill, J.E. Greene, and P. Desjardins, “Continuum model of surface roughening and epitaxial breakdown during low-temperature Ge(001) molecular beam epitaxy.” *J. Appl. Phys.* **109**, 063513 (2011).
- B.M. Howe, E. Sammann, J.G. Wen, T. Spila, J.E. Greene, L. Hultman, I. Petrov, “Real-time control of AlN incorporation in epitaxial Hf1-xAlxN using high-flux, low-energy (10-40 eV) ion bombardment during reactive magnetron sputter deposition from a Hf0.7Al0.3 alloy target.” *Acta Materialia* **59**, 421-428 (2011).