

**JENNIFER E. CURTIS  
CURRICULUM VITAE**

Assistant Professor  
School of Physics  
Petit Institute for Bioengineering and Biosciences (IBB)  
Integrative Biosystems Institute (IBSI)  
Georgia Institute of Technology

**Personal Data:**

Born: 9/15/1975                      Denver, Colorado

**Educational Background:**

B.A.	Physics	1997	Columbia University
Ph.D.	Physics	2002	University of Chicago

**Employment History:**

Graduate Teaching Assistant, University of Chicago	1997-1998
Graduate Research Assistant, University of Chicago	1998-2002
Postdoctoral Fellow, University of Heidelberg	11/2002 – 2003
Alexander von Humboldt Fellow, University of Heidelberg	2004-2005
Group Leader, University of Heidelberg	2006
Assistant Professor, Physics, Georgia Institute of Technology	2007 - present

**Honors, Awards, and Recognitions:**

1996	Melvin Schwartz Physics Scholarship, Columbia University
1997	NCAA Postgraduate Academic Scholarship
1999	Geophysical Fluid Dynamics Fellow, Woods Hole Oceanographic Inst.
2001	Women in Science and Engineering (WISE) Travel Award
2002	Annual James Franck Institute Graduate Symposium, 2nd place
2004-2005	Alexander von Humboldt Fellow
2010-2014	NSF CAREER Award

**Current Fields of Interest:**

- Cell mechanics : pericellular coat, cell migration, cell adhesion, phagocytosis
- Molecular biophysics: hyaluronan-protein networks and aggregates; molecular clustering in phagocytosis; biopolymers
- BioNanotechnology: Thermal Chemical Nanolithography (TCNL), graphene-based biosensors; Photobleaching-activated chemical microlithography
- Optical manipulation: Holographic Optical Tweezers, Optical Vortices

**Refereed Publications:**

1. J. E. Curtis, B. A. Koss and D. G. Grier, "Dynamic holographic optical tweezers," *Opt. Commun.*, **207**, 169 (2002).
2. J. E. Curtis and D. G. Grier, "The structure of optical vortices," *Phys. Rev. Lett.*, **90**, 133901, (2003).
3. J. E. Curtis and D. G. Grier, "Modulated optical vortices", *Opt. Lett.* **28**, (2003).
4. J. E. Curtis, C. H. J. Schmitz and J. P. Spatz, "Symmetry dependence of holograms for optical trapping," *Opt. Lett.*, **30**, 2086 (2005).
5. C. H. J. Schmitz, J. P. Spatz and J. E. Curtis, "High-precision positioning of holographic optical tweezers," *Opt. Exp.*, **13**, 8678 (2005).
6. C. H. J. Schmitz, K. Uhrig, J. P. Spatz and J. E. Curtis, "Tuning the orbital angular momentum in optical vortex beams", *Opt. Exp.* **14**, 6604 (2006).
7. V. K. Kodali, W. Roos, J. P. Spatz and J. E. Curtis, "Cell-assisted assembly of colloidal crystallites", *Soft Matter* **3**, 337-348 (2007).

Highlighted by Chemical Biology in "Cell Structure Made Crystal Clear?" Vol. 2, I  
ISSN 1747-1605, (2007).

8. C. Mohrdieck, F. Dalmas, E. Arzt, R. Tharmann, M. M. A. E. Claessens, A. R. Bausch, A. Roth, E. Sackmann, C. H. J. Schmitz, J. Curtis, W. Roos, S. Schulz, K. Uhrig, J. P. Spatz, "Biomimetic models of the actin cytoskeleton", *Small* **3**: 1016-1022 (2007).
9. T. Haraszti, S. Schulz, K. Uhrig, R. Kurre, W. Roos, C. H. J. Schmitz, J. E. Curtis, T. Maier, A. E. M. Clemen, and J. P. Spatz, "Biomimetic models of the actin cortex", *Biophysical Rev. & Lett.* **4**:17-32 (2009).
10. K. Uhrig, R. Kurre, C. Schmitz, J. E. Curtis, T. Haraszti, A. E.-M. Clemen, J. P. Spatz, "Optical force sensor array in a microfluidic device based on holographic optical tweezers", *Lab on a Chip* **9**:661-668 (2009).

Artwork highlighted on inside cover of Lab on a Chip.

11. H. Boehm, T. A. Munding, C. H. J. Boehm, V. Hagel, U. Rauch, J. P. Spatz, J. E. Curtis, "Mapping the mechanics and macromolecular organization of hyaluronan-rich cell coats", *Soft Matter* **5**, 4331-4337 (2009).
12. D. Wang\*, V. Kodali\*, W. D. Underwood II, J. E. Jarvholm, T. Odaka, S. C. Jones, M. Rumi, Z. Dai, W. P. King, S. R. Marder, J. E. Curtis<sup>\$</sup> and Elisa Riedo<sup>\$</sup>, "Thermochemical

nanolithography of multi-functional nanotemplates for assembling nano-objects”, *Adv. Funct. Mat.* **19**, 3696-3702 (2009).

\*Shared first author ; § Corresponding authors

Research highlighted on journal cover December 2009.

Press : Science Daily; NewsWise; Chemie.de; EurekAlert ; NILT Nano NewsLetter

13. J. Scrimgeour, V. Kodali, D. Kovari, J. E. Curtis, “Photobleaching-activated chemical micropatterning on self-assembled monolayers”, in press *J. Phys., Condensed Matter\** (2010).

\* This is part of a Special Edition focused on “Cell-substrate interactions”.

14. A. San Miguel, J. Scrimgeour, J. E. Curtis, S. H. Behrens, “Smart colloidosomes with a dissolution trigger”, submitted.

### Non-Refereed Publications

C. H. J. Schmitz, J. E. Curtis, J. P. Spatz, “Constructing and probing a biomimetic models of the actin cortex with holographic optical tweezers”, *SPIE Proc.* **5514**, 446 (2004).

J. E. Curtis and J. P. Spatz, “Getting a Grip: Hyaluronan-mediated cellular adhesion”, *SPIE Proc.* **5514**, 455 (2004).

### Book Chapters

D. Wang, R. Szoszkiewicz, V. Kodali, J. E. Curtis, S. Marder, E. Riedo, “A New-AFM Based Lithography Method: Thermochemical Nanolithography”, *Applied Scanning Probe Methods, Volume 10: Biomimetics and Industrial Applications*, Springer-Verlag (2010).

D. Wang, V. K. Kodali, J. E. Curtis, E. Riedo, “Nanofabrication of Functional Nanostructures by Thermochemical Nanolithography (TCNL)” to appear as a book chapter in *Tip Based Nanofabrication: Fundamentals and Applications*, Springer (2010).

### Patents

1. [Apparatus for using optical tweezers to manipulate materials](#), D. G. Grier, E. R. Dufresne, J. E. Curtis and B. A. Koss; U. S. Patent 6,626,546, The University of Chicago (2003);  
U. S. Patent 6,846,084, The University of Chicago (2005); U. S. Patent 7,104,659, The University of Chicago (2006);
2. [Use of multiple optical vortices for pumping, mixing and sorting](#), J. E. Curtis, B. A. Koss and D. G. Grier; U. S. Patent 6,737,634, The University of Chicago (2004);  
U. S. Patent 6,858,833, The University of Chicago (2005);
3. [Multiple optical vortices for manipulating particles](#), J. E. Curtis, B. A. Koss and D. G. Grier; U. S. Patent 6,995,351, The University of Chicago (2006).

4. [Transverse optical accelerator and generalized optical vortices](#), D. G. Grier and J. E. Curtis; U. S. Patent 7,109,473, The University of Chicago (2006); U. S. Patent 7,232,989, The University of Chicago (2007).
5. [Use of multiple optical tweezers for pumping, mixing and sorting](#), J. E. Curtis, B. A. Koss and D. G. Grier, U. S. Patent 7,176,445, The University of Chicago (2007).
6. [Thermochemical nanolithography of multi-functional templates for selective assembly of bioactive proteins](#), D. Wang, E. Riedo, V. K. Kodali, J. E. Curtis, W. D. Underwood II, T. Okada, S. C. Jones, M. Rumi, S. R. Marder, R. Szoszkiewicz, and W. P. King, US Provisional Patent 61/182190 (2009).

### Meetings and Symposia:

#### Invited Talks since 2007

- Integrative BioSystems Institute (IBSI) Chalk Talk 5/2010  
Georgia Institute of Technology  
Atlanta, Georgia
- International Symposium on Surface Science Aspects 4/19 – 4/21/2010  
of Pharmaceutical Science, Pharmacology, Cosmetics and  
Biotechnology, Danbury, Connecticut
- Second International Conference on Trends in Optical Manipulation 4/11–4/16/2010  
Oberurgl, Austria
- Molecular and Cellular Biophysics Seminar 4/5/2010  
Department of Chemistry and Medical School  
University of North Carolina, Chapel Hill
- Southeastern Section of the American Physical Society (SESAPS) 11/14/2009  
Atlanta, Georgia  
*Biophysical studies of the cell coat*
- IBB Breakfast Club Series 10/20/09  
Georgia Institute of Technology  
Atlanta, Georgia  
*Mechanics of the Cell: Biology Meets Physics*
- Biological Surfaces and Interfaces 6/27 – 7/2/09  
European Science Foundation and European Molecular Biology  
Organization (ESF-EMBO) International Symposium  
Costa Brava, Spain  
*Mapping the Mechanics and Macromolecular Organization of  
Hyaluronan-Rich Cell Coats*
- Third Southeast Workshop on Soft Materials and Interfaces 5/15/2009  
Atlanta, Georgia Institute of Technology  
*Untangling the cell coat mystery: A physical investigation*
- Conference on Optical Trapping and its Applications 4/25-4/30/09  
Optics and Photonics Congress  
Vancouver, Canada

*Life at the Edge: Optical force probe measurements of the cell coat*

- Emory University Physics Colloquium 11/21/08  
*At the invisible rim: Polymer physics of the cell coat*
- University of Alabama, Birmingham Physics Colloquium 10/31/08  
*At the invisible rim: Polymer physics of the cell coat*
- Nanomanufacturing with Molecular Recognition Workshop 10/27-28/08  
Hosted by DARPA and the Defense Science Research Council (DSRC)  
*Thermochemically-fabricated orthogonal nanopatterns as templates for multiple bioactive proteins*
- Colloid and Soft Matter Bag Lunch Seminar (Georgia Tech/Emory) 6/25/2008  
*Holographic Optical Tweezers*
- Optical Microscopy in Good Shape Symposium 6/5-6/6/08  
European Science Foundation (ESF) Workshop  
Paris, France  
*Structural mapping of the cell coat with holographic optical tweezers*
- Florida International University, Miami, Florida 4/3/2008  
Invited by Society of Physics Students (SPS)  
*Molecular and cellular biophysics*
- GEM4 Conference on Cancer, Singapore 7/1-7/6/07  
International Conference on Materials for Advanced Technologies (ICMAT)  
*The dynamic structure of the pericellular coat on living cells*

**Contributed Talks (since 2007)**

- American Physical Society (APS) Meeting 3/18/2010  
Portland, Oregon  
*Characterization of Hyaluronan-Protein Microstructures and Polymer Solutions*
- Structural Biology and Molecular Biophysics (SBMBP) Symposium 7/24/2009  
Atlanta, Georgia (Georgia Institute of Technology)  
*Mapping the Mechanics and Macromolecular Organization of Hyaluronan-Rich Cell Coats*
- Materials Research Society (MRS) Meeting 4/15/2009  
Talks presented by Vamsi Kodali  
1. *Polyelectrolyte Capsules as Biological Force Sensors*  
2. *Thermochemical Nanolithography of Multi-functional Templates for Selective Assembly of Bioactive Proteins*
- American Physical Society March Meeting 3/16/09  
Talk presented by Debin Wang

*Thermochemical Nanolithography of Multi-functional Templates for Selective Assembly of Bioactive Proteins*

- Biophysical Society (BPS) Meeting 2/28- 3/4/09  
 Boston, Massachusetts  
 Posters presented by students:
  1. *Cell Coat Mediated Cell Migration* (L. McLane)
  2. *Thermochemical Nanolithography of Multi-functional Templates for Selective Assembly of Bioactive Proteins* (V. Kodali)
  3. *Understanding Mechanics of Phagocytosis Uptake Using Deformable Polyelectrolyte Microcapsules* (V. Kodali)
  4. *Untangling Hyaluronan-Protein Networks and Function* (M. Bedoya)
  5. *Biophysics of the Cell Coat* (H. Boehm)
  
- American Society for Cell Biology (ASCB) Meeting 12/13 - 12/17/08  
 Talk presented by Heike Boehm  
*New Tools for the Modification and Characterization of Highly-Hydrated Pericellular Coats*
  
- Biophysical Society (BPS) Meeting 2//2- 2/6/08  
 Long Beach, California  
 Poster presented by H. Boehm  
*Mapping the Mechanostructure of Hyaluronan-Dependent Pericellular Matrices*
  
- 7<sup>th</sup> International Conference on Hyaluronan 4/22 –4/29/07  
 International Society for Hyaluronan Sciences  
 Charleston, South Carolina  
 Poster presented by H. Boehm  
*A Biophysicist's View of the Pericellular Coat*

**Committees – Georgia Tech:**

- Biophysics Search Committee (Physics) 2007-2008 & 2008-2009
- Comprehensive Exam Committee (Physics) 2007
- IBSI Graduate Fellowship Committee 2008
- IBB Director Search Committee 2008-2009
- Faculty Advisory Committee (elected / Chair) 2008-2009 / 2009-2010
- Search Committee for Cryo Electron Microscope candidate  
 2009-2010
- Steering Committee for Molecular Biophysics Training Program 2009-2010
- Thesis Advisory Committee Member 2007-2010  
 5 physics graduate students and 4 chemistry graduate students

