

Silvija Gradečak, Ph.D.

Thomas Lord Associate Professor of Materials Science and Engineering

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EDUCATION

- 11/03 **Ph.D. in Physics**
Interdisciplinary Center of Electron Microscopy, Swiss Federal Institute of Technology (Lausanne, Switzerland)
Thesis: “Structural and optical properties of laterally overgrown gallium nitride studied by electron microscopy”, advisor Prof. Pierre Stadelmann
- 11/99 **Diploma in Physics**
Department of Physics, Faculty of Science, University of Zagreb (Zagreb, Croatia)
Diploma thesis: “Thermal and structural properties of hard carbons”

ACADEMIC/PROFESSIONAL APPOINTMENTS

- 07/12- **Thomas Lord Associate Professor of Materials Science & Engineering**, with tenure
07/13
Massachusetts Institute of Technology (Cambridge, Massachusetts)
- 07/10-07/12 **Thomas Lord Assistant Professor of Materials Science & Engineering**
Massachusetts Institute of Technology (Cambridge, Massachusetts)
- 07/09-06/10 **Assistant Professor of Materials Science & Engineering**
Massachusetts Institute of Technology (Cambridge, Massachusetts)
- 09/06-06/09 **Merton C. Flemings Assistant Professor of Materials Science and Engineering**
Massachusetts Institute of Technology (Cambridge, Massachusetts)
- 02/04-08/06 **Postdoctoral Research Fellow**
Professor Charles M. Lieber group, Department of Chemistry and Chemical Biology, Harvard University (Cambridge, Massachusetts)
- 12/03-01/04 **Research Associate**
Institute of Quantum Electronics and Photonics, Swiss Federal Institute of Technology (Lausanne, Switzerland)
- 11/99-11/03 **Graduate Research and Teaching Assistant**
Interdisciplinary Center of Electron Microscopy, Swiss Federal Institute of Technology (Lausanne, Switzerland)
- 04/98-10/99 **Research Assistant**
Laboratory for Structural Investigation, Department of Physics, Faculty of Science, University of Zagreb (Zagreb, Croatia)

RESEARCH INTERESTS

Nano-electronics and nano-photonics; materials for energy harvesting and conversion; synthesis and integration of inorganic materials with confined dimensions – including two dimensional films, one dimensional nanowires/nanotubes, and zero dimensional nanocrystals –; III-V semiconductor epitaxial films and low-dimensional systems; development of advanced and *in-situ* electron microscopy techniques.

HONORS AND AWARDS

- Inaugural ACS *Nano Letters* Young Investigator Lectureship 2012
- Thomas Lord Career Development Chair 2010
- NSF CAREER (Faculty Early Career Development) Award 2008-2013
- 3M Innovation Award 2007
- MIT Alumni Fund Award for Teaching and Education Enhancement 2007
- Merton C. Flemings Career Development Chair 2006
- Swiss National Science Foundation Fellowship for Prospective Researchers 2004
- Diploma in Entrepreneurship Course at the CREATE Branco Weiss Chairs of Entrepreneurship and Innovation, Lausanne, Switzerland 2003
- Dean's Prize for the Best Student Project at University of Zagreb in 1995/96 Academic Year, Zagreb, Croatia 1996
- Scholarship of the City Council of Zagreb, Croatia 1996

PROFESSIONAL ACTIVITIES

- *Symposium Organizer*, MRS Spring Meeting 2014: “Semiconductor Nanowires: Synthesis, Properties and Applications”
- *Symposium Organizer*, National Conference on Crystal Growth and Epitaxy 2013: “Nano-electronics and nano-photonics”
- *Project Review Panelist*, Brookhaven National Lab, Center for Functional Nanomaterials (CFN)
- *Project Review Panelist*, Los Alamos National Lab, Center for Integrated Nanotechnologies (CINT)
- *International Scientific Board*, 4th European Nanomedicine Summer School
- *Guest Editor*, Physica Status Solidi Rapid Research Letters (special issue)
- *North American Editor*, Journal of Experimental Nanoscience, 2009-2013
- *Symposium Organizer*, MRS Spring Meeting 2009: Symposium AA “Semiconductor Nanowires -- Growth, Size-Dependent Properties, and Applications”
- *Internal Advisory Panel*, Center for Excitonics, DOE-funded Energy Frontier Research Center, 2011-present
- *Organization of the scientific project International Leonid Watch – Croatia*, Ulan Bator, Mongolia, November, 1998. Results of the project were highlighted by Nature Science Update, Natural History Magazine, New Scientist, BBC online, and Discovery Channel.
- *Organization of the scientific expedition Electrophonic Fireball Project*, Terra Alta region, Spain, November, 2002. The project was announced as one of scientific highlights at the Swiss Federal Institute of Technology (Lausanne, Switzerland) in 2002 by Dean Professor Giorgio Margaritondo.
- *Professional Societies*: Materials Research Society, American Chemical Society, American Physical Society, Optical Society of America
- *Grant/Proposal Reviewer and Panelist*:
 - National Science Foundation (NSF: CAREER, DMR, and SBIR programs)
 - Department of Energy (DOE)
 - Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory
 - National Research Foundation (NRF) of Korea, Global Research Network Program
 - National Research Foundation (NRF) of Singapore, Competitive Research Program
 - University of California Energy Institute (UCEI), Berkeley
- *Journal Reviewer*: Nature Nanotechnology, Nature Photonics, Progress in Materials Science, Nano Letters, PNAS, Journal of the American Chemical Society, Advanced Functional Materials, Journal of Physical Chemistry, PLoS ONE, Crystal Growth and Design, Applied Physics Letters, New Journal of Physics, Nanotechnology, IEEE Electron Device Letters, Journal of Applied Physics, Materials Research Bulletin, Electrochemical and Solid-State Letters, Journal of Materials Research,

Nanoscale, Journal of Crystal Growth, Journal of Physics D: Applied Physics, Journal of Physics: Condensed Matter

• *MIT Service:*

- 2013-present MIT DMSE Faculty Search Committee
- 2012-present MTL Seminar Series Committee
- 2012-present nMaSS Faculty Advisory Committee
- 2010 MIT-Masdar Institute Imaging Facility Advisory Committee
- 2008-present MIT DMSE Committee on Undergraduate Students, Core Instructor Subcommittee
- 2008-present MIT DMSE Committee on Undergraduate Students, Faculty Advisor Subcommittee
- 2008-present MIT DMSE Undergraduate Faculty Advisor
- 2008-2010 Chair of the Electronic, Photonic and Magnetic Materials Academic Program, MIT DMSE Graduate Program
- 2008-2009 Laboratory for Advanced Materials Planning Committee
- 2008-2009 MIT School of Engineering Faculty Search in Energy (Reporting to the Dean)
- 2007-2009 MIT Materials Science and Engineering Seminar Series Organizer
- 2007-2008 MIT Freshman Advisor
- 2006-2009 MIT DMSE Graduate Admissions Committee

TEACHING EXPERIENCE

- Fall 2010-2013 **MIT 3.012 Fundamentals of Materials**, lecturer - in charge
- Spring 2007-2013 **MIT 3.074/3.34 Imaging of Materials**, developed from scratch a new graduate and undergraduate course. In 2009 and 2010, the course was offered via videoconference to students at the National University of Singapore and the lectures were video-recorded. Awarded (competitive) MIT Alumni Fund Award for Teaching and Education Enhancement as a support of the course development. Students' teaching rating 6.8 (7.0 scale).
- Fall 2006-2009 **MIT 3.014 Materials Laboratory**, in 2008 and 2009 in charge of the course (coordinating 12 laboratory instructors, communication lecturers, and technical instructors) after serving as a co-instructor for two years. Students' teaching rating 6.5 (7.0 scale).
- Summer 2009-2011 **MIT Professional Education**, lecturer
6.75s Nanostructure Fabrication (Summer 2009-2011)
PI.70s Solar Energy: Capturing the Sun (Summer 2010-2011)
- Winter 2007 **MIT Introduction to the Theory of Transmission Electron Microscopy**, lecturer
- 2000-2004 **Electron Microscopy Instructor**, Theory and practice of transmission electron microscopy; Trained more than 100 electron microscopy users
Swiss Federal Institute of Technology (Lausanne, Switzerland)
- 2000-2004 **Undergraduate Teaching Assistant**, Practical Electron Microscopy Course
Swiss Federal Institute of Technology (Lausanne, Switzerland)
- 1998-1999 **Undergraduate Teaching Assistant**, General Physics Course
Department of Physics, Faculty of Science, University of Zagreb (Zagreb, Croatia)

ADVISING

Graduate Students Supervised (15 total): Michael Tambe (graduated 06/10), Sung-Keun Lim (graduated 04/11, MRS 2011 Spring Meeting Graduate Student Award winner), Megan Brewster (NSF and NDSEG Fellow, graduated 05/11), Matthew Smith (graduated 6/2012, 2012 Best DMSE PhD Thesis Award winner), Samuel Crawford (NSF Fellow, graduated September 2013), Eric Jones (NSF Fellow), Xiang Zhou, Jordan Chesin, Sema Emrez, John Hanson, Paul Rekemeyer, Jian Wei Jayce Cheng, Hyoungwon Park, Zhibo Zhao, Olivia Dolores Hentz.

Doctoral Theses: served as a PhD thesis reader to 42 graduate students.

Postdoctoral Fellows and Visiting Scholars (11 total): Shenqiang Ren (currently Assistant Professor at the University of Kansas), Ming-Yen Lu (currently Assistant Professor at National Chung Cheng University, Chia-Yi, Taiwan), Chun-Hao Tseng, Xiaosheng Fang (currently Professor at Fudan University, Shanghai, China), Mingsheng Wang (currently Professor at the Xiamen university), Sehoon Chang, Kamal Baloch, Hyesung Park, Matthew Smith, Filippo Fabbri, Matteo Seitza.

Undergraduate Research Advisor to 8 students.

Research and Teaching Development Advisor to Prof. Amal Abdulla Al Ghaferi, Masdar Institute of Technology.

PUBLICATIONS

Journal articles

1. M.Y. Lu, X. Zhou, C.Y. Chiu, S. Crawford and S. Gradečak. "From GaN to ZnGa₂O₄ through a low temperature process: nanotube and heterostructure arrays", *submitted*.
2. J. Chesin, S. Gradečak, "Efficiency of III-nitride nanowire light-emitting diodes", *submitted*
3. E. Jones, D. Cooper, J.-L. Rouviere, A. Béch , M. Azize, T. Palacios, and S. Gradečak, "Towards rapid nanoscale measurement of strain in III-nitride heterostructures", *Applied Physics Letters* **103**, 231904 (2013).
4. D. Recht, M. J. Smith, S. Charnvanichborikarn, J. T. Sullivan, M. T. Winkler, J. Mathews, J. M. Warrender, T. Buonassisi, J. S. Williams, S. Gradečak, M. J. Aziz, "Supersaturating silicon with transition metals by ion implantation and pulsed laser melting", *Journal of Applied Physics* **114**, 124903 (2013).
5. X. Zhou, M.-Y. Lu, Y.-J. Lu, S. Gwo, and S. Gradečak, "Correlation of doping, structure and carrier dynamics in a single GaN nanorod", *Applied Physics Letters* **102**, 253104 (2013).
6. A. Gumennik, L. Wei, G. Lestoquoy, A. M. Stolyarov, X. Jia, P. H. Rekemeyer, M. J. Smith, X. Liang, B. Grena, S. G. Johnson, S. Gradečak, A. F. Abouraddy, J. D. Joannopoulos, Y. Fink, "Silicon-in-silica spheres via axial thermal gradient in-fibre capillary instabilities", *Nature Communications* **4**, 2216 (2013).
7. M. de la Mata, X. Zhou, F. Furtmayr, J. Teubert, S. Gradečak, M. Eickhoff, A. F. i Morral, J. Arbiol, "Bandgap engineering: 0D, 1D and 2D quantum structures in a nanowire", *Journal of Materials Chemistry C* **1**, 4300 (2013).
8. K. H. Baloch, A. C. Johnston-Peck, K. Kisslinger, E. A. Stach, S. Gradečak, " Revisiting the "In-clustering" question in InGaN through the use of aberration-corrected STEM and low-loss EELS below the knock-on threshold ", *Applied Physics Letters* **102**, 191910 (2013).
9. Li. Hu, M. M. Brewster, C. Tang, S. Gradečak, X. Fang, "Heteroepitaxial growth of GaP/ZnS nanocable with superior optoelectronic response", *Nano Letters* **13**, 1941 (2013).

10. M. J. Smith, M.-J. Sher, B. Franta, E. Mazur, S. Gradečak, "Surface structuring and dopant incorporation mechanisms during thin-film femtosecond laser doping", accepted for publication in *Applied Physics A*
11. H. Park, S. Chang, M. Smith, S. Gradečak, J. Kong, "Interface engineering of graphene for universal applications in organic solar cells and organic light emitting diodes", *Scientific Reports* **3**, 1581(1-8), 2013.
12. M. S. Wang, J. P. Hanson, S. Gradečak[†], M. J. Demkowicz, "Cutting apart of γ " precipitates by dislocations emitted from nanoscale surface notches in Ni-base alloy 725", *Materials Research Letters* **1**, 77 (2013). ([†]*corresponding author*)
13. G. Haberfehlner, M. J. Smith, J.-C. Idrobo, G. Auvert, M.-J. Sher, M. T. Winkler, E. Mazur, N. Gambacorti, S. Gradečak, P. Bleuët, "Dopant segregation in femtosecond laser-doped silicon revealed by electron tomography", *Microscopy and Microanalysis* **19**, 716 (2013).
14. J. Jean, S. Chang, P. R. Brown, J. J. Cheng, P. H. Rekemeyer, M. G. Bawendi, S. Gradečak, Vladimir Bulovic, "Nanowire arrays for enhanced photocurrent in quantum dot solar cells", *Advanced Materials* **25**, 2790 (2013).
15. F. Fabbri, M. J. Smith, D. Recht, M. J. Aziz, S. Gradečak[†], G. Salvati[†], "Depth-resolved cathodoluminescence spectroscopy of silicon supersaturated with sulfur", *Applied Physics Letters* **102**, 031909(1-5), 2013. ([†]*corresponding authors*)
16. H. Park[†], S. Chang[†], J. Jean, J. J. Cheng, P. T. Araujo, M. Wang, M. Bawendi, M. S. Dresselhaus, V. Bulovic, J. Kong, S. Gradečak, "Graphene cathode-based ZnO nanowire hybrid solar cells", *Nano Letters* **13**, 233-239 (S1-S4), 2013. ([†]*equally contributed*)
- One of the Top 20 Most Read Articles in Nano Letters for January 2013, March and April 2013 and for a 12-month period in April-December 2013.*
17. S. Crawford, S. K. Lim, S. Gradečak, "Fundamental insights into nanowire diameter modulation and the liquid/solid interface", *Nano Letters* **13**, 226-232 (S1-S10), 2013.
18. S. K. Lim[†], S. Crawford[†], G. Haberfehlner, S. Gradečak, "Controlled modulation of diameter and composition along individual III-V nitride nanowires", *Nano Letters*, **13**, 331-3366 (S1-S11, video 1, video 2), 2013. ([†]*equally contributed*)
- Selected as the February 2013 Nano Letters Cover Page article.*
19. M. J. Smith, M.-J. Sher, B. Franta, Y.-T. Lin, E. Mazur, S. Gradečak, "The origins of pressure-induced phase transformations during the surface texturing of silicon using femtosecond laser irradiation", *Journal of Applied Physics* **112**, 083518(1-8), 2012.
20. E. J. Jones, M. Azize, M. J. Smith, T. Palacios, S. Gradečak, "Correlating stress generation and sheet resistance in InAlN/GaN nanoribbon high electron mobility transistors", *Applied Physics Letters* **101**, 113101(1-3), 2012.
21. F. Qian, M. Brewster, S. K. Lim, C. Greene, O. Laboutin, J. W. Johnson, S. Gradečak, Y. Cao, Y. Li, "Synthesis and optical studies of AlN/GaN multiple quantum well nanowire structures", *Nano Letters* **12**, 3344–3350 (S1-S7), 2012.
22. X. Zhou, J. Chesin, S. Crawford, S. Gradečak, "Using seed particle composition to control structural and optical properties of GaN nanowires", *Nanotechnology* **23**, 285603 (1-9), 2012.
23. M. T. Winkler, M.-J. Sher, Y.-T. Lin, M. Smith, H. Zhang, S. Gradečak, E. Mazur, "Studying femtosecond-laser hyperdoping by controlling surface morphology", *Journal of Applied Physics* **111**, 093511(1-7), 2012.

24. M. Brewster, X. Zhou, M. Y. Lu, and S. Gradečak, "The interplay of structure and optical properties in individual ZnO nanostructures", invited review, *Nanoscale* **4**, 1455-1462, 2012.

One of the Top 10 most-read Nanoscale articles for 02/2012.

25. S. Ren, M. Bernardi, R. R. Lunt, V. Bulovic, J. C. Grossman, S. Gradečak, "Towards efficient carbon nanotube / P3HT solar cells: active layer morphology, electrical and optical properties", *Nano Letters* **11**, 5316-5321 (2011).

One of the Most Read Articles in Nano Letters for 11/2011.

26. M. Smith, M. Winkler, M.-J. Sher, Y.-T. Lin, E. Mazur, S. Gradečak, "Effects of a thin film dopant precursor on the structure and properties of femtosecond-laser doped silicon", *Applied Physics A* **105**, 795-800 (2011).

27. M. Azize, O. Saadat, A. Hsu, M. Smith, S. Guo, S. Gradečak, T. Palacios, "High electron mobility transistors based on InAlN/GaN nano-ribbons", *IEEE Electron Device Letters* **32**, 1680-1682 (2011).

28. S. Ren, L.-Y. Chang, S. K. Lim, J. Zhao, M. Smith, N. Zhao, V. Bulović, M. Bawendi, S. Gradečak, "Inorganic-organic hybrid solar cell: bridging quantum dots to conjugated polymer nanowires", *Nano Letters* **11**, 3998-4002 (2011).

One of the Most Read Articles in Nano Letters for 09/2011, 10/2011.

29. M. Smith, Y.-T. Lin, M.-J. Sher, M. Winkler, E. Mazur, S. Gradečak, "Pressure-induced phase transformations during femtosecond-laser doping of silicon", *Journal of Applied Physics* **110**, 053524 (2011).

Selected for Virtual Journal of Ultrafast Science, October 2011

30. M. Brewster, M.-Y. Lu, S. K. Lim, M. Smith, X. Zhou, and S. Gradečak, "The Growth and Optical Properties of ZnO Nanowalls", *Journal of Physical Chemistry Letters* **2**, 1940-1945 (2011).

31. M. Brewster, X. Zhou, S. K. Lim, and S. Gradečak, "Role of Au in the growth and nanoscale optical properties of ZnO nanowires," *Journal of Physical Chemistry Letters* **2**, 586-591 (2011).

32. S. Ren, N. Zhao, S. Crawford, M. Tambe, V. Bulović, and S. Gradečak, "Heterojunction photovoltaics using GaAs nanowires and conjugated polymers", *Nano Letters* **11**, 408-413 (2011).

33. M. Tambe, S. Ren, S. Gradečak, "Effects of gold diffusion on n-type doping of GaAs nanowires", *Nano Letters* **10**, 4584-4589 (2010).

34. S. Ren, S. K. Lim, and S. Gradečak, "Synthesis and thermal responsiveness of self-assembled gold nanoclusters", *Chemical Communications* **46**, 6246-6248(1-6) (2010).

Featured as an inner cover article of the 34th issue of the Chemical Communications.

35. S. K. Lim, S. Crawford, and S. Gradečak, "Growth mechanism of GaN nanowires: preferred nucleation site and effect of hydrogen", *Nanotechnology* **21**, 345604 (2010).

36. C. H. Tseng, M. J. Tambe, S. K. Lim, M. J. Smith, and S. Gradečak, "Position controlled nanowire growth through Au nanoparticles synthesized by galvanic reaction", *Nanotechnology* **21**, 165605(1-6), 2010.

Featured as a Lab Talk Article on nanotechweb.org, April 2010

37. M. Brewster, O. Schimek, S. Reich, and S. Gradečak, "Exciton-phonon coupling in individual GaAs nanowires studied using resonant Raman spectroscopy", *Physical Review B* **80**, 201314(R1-4), 2009.

Selected for Virtual Journal of Nanoscale Science and Technology, December 7, 2009.

38. S. K. Lim, M. Brewster, F. Qian, Y. Li, C. M. Lieber, and S. Gradečak, "Direct correlation between structural and optical properties of III-V nitride nanowire heterostructures with nanoscale resolution", *Nano Letters* **9**, 3940–3944, 2009.
39. X. Fang, Y. Bando, U. K. Gautam, T. Zhai, S. Gradečak, D. Golberg "Heterostructures and superlattices in one-dimensional nanoscale semiconductors", *Journal of Materials Chemistry* **19**, 5683-5689, 2009.
40. M. Tambe, S. K. Lim, M. J. Smith, L. F. Allard, and S. Gradečak, "Realization of defect-free epitaxial core-shell GaAs/AlGaAs nanowire heterostructures", *Applied Physics Letters* **93**, 151917(1-3), 2008.
Selected for Virtual Journal of Nanoscale Science & Technology, September 8, 2008
41. F. Qian, Y. Li, S. Gradečak, H. G. Park, Y. Dong, Y. Ding, and Z. L. Wang, C. M. Lieber, "Multi-quantum well nanowire heterostructures for wavelength-controlled lasers", *Nature Materials* **7**, 701-706, 2008.
Featured in Nature Photonics 2, 594 (2008), and in Materials Today 11, 11 (2008).
42. S. K. Lim, M. Tambe, M. Brewster, S. Gradečak, "Controlled growth of ternary alloy nanowires using metalorganic chemical vapor deposition", *Nano Letters* **8**, 1386-1392 (2008).
43. Y. Li, J. Xiang, F. Qian, S. Gradečak, Y. Wu, H. Yan, D. A. Blom, and C. M. Lieber, "Dopant-Free GaN/AlN/AlGaN Radial Nanowire Heterostructures as High Electron Mobility Transistors", *Nano Letters* **6**, 1468-1473, 2006.
44. S. Gradečak, F. Qian, Y. Li, H. G. Park, and C. M. Lieber, "GaN nanowire lasers with low lasing thresholds", *Applied Physics Letters* **87**, 173111(1-3), 2005.
Selected for Virtual Journal of Nanoscale Science & Technology, October 31, 2005
45. F. Qian†, S. Gradečak †, Y. Li†, C. Y. Wen, C. M. Lieber, "Core/multishell nanowire heterostructures as multicolor, high-efficiency light-emitting diodes", *Nano Letters* **5**, 2287-2291, 2005. (†*equally contributed*)
46. P. V. Radovanovic, C. J. Barrelet, S. Gradečak, F. Qian, and C. M. Lieber, "General synthesis of manganese-doped II-VI and III-V semiconductor nanowires", *Nano Letters* **5**, 1407-1411, 2005.
47. B. Lukić, J. W. Seo, E. Couteau, K. Lee, S. Gradečak, R. Berkecz, K. Hernadi, S. Delpeux, T. Cacciaguerra, F. Béguin, A. Fonseca, J. B. Nagy, G. Csányi, A. Kis, A. J. Kulik, and L. Forró, "Elastic modulus of multi-walled carbon nanotubes produced by catalytic chemical vapour deposition", *Applied Physics A* **80**, 695-700, 2005.
48. J. Dorsaz, J. F. Carlin, S. Gradečak, and M. Ilegems, "Progress in AlInN-GaN Bragg reflectors: application to a microcavity light emitting diode", *Journal of Applied Physics* **97**, 084505(1-6), 2005.
49. S. Gradečak, P. Stadelmann, V. Wagner, and M. Ilegems, "Bending of dislocations in GaN during epitaxial lateral overgrowth", *Applied Physics Letters* **85**, 4648-4650, 2004.
50. F. Qian†, Y. Li†, S. Gradečak†, D. L. Wang, C. J. Barrelet, and C. M. Lieber, "Gallium nitride-based nanowire radial heterostructures for nanophotonics", *Nano Letters* **4**, 1975-1979, 2004. (†*equally contributed*)
Featured in Materials Today and Reactive Reports. One of four Hot Papers from Nano Letters for September-October 2006
51. D. C. Bell, Y. Wu, C. J. Barrelet, S. Gradečak, J. Xiang, B. P. Timko, and C. M. Lieber, "Imaging and analysis of nanowires", *Microscopy Research and Technique* **64**, 373-389, 2004.

52. J. Dorsaz, J. F. Carlin, C. M. Zellweger, S. Gradečak, and M. Ilegems, "InGaN/GaN resonant-cavity LED including an AlInN/GaN Bragg mirror", *physica status solidi (a)* **201**, 2675-2678, 2004.
53. S. Gradečak, V. Wagner, M. Ilegems, T. Riemann, J. Christen, and P. Stadelmann, "Microscopic evidence of point defect incorporation in laterally overgrown GaN", *Applied Physics Letters* **80**, 2866-2868, 2002.
54. J. C. Lasjaunias, M. Saint-Paul, A. Bilušić, A. Smontara, S. Gradečak, A. M. Tonejc, A. Tonejc, and N. Kitamura, "Acoustic and thermal transport properties of hard carbon formed from C₆₀ fullerene", *Physical Review B* **66**, 014302(1-11), 2002.
55. V. Wagner, O. Parillaud, H. J. Buhlmann, M. Ilegems, S. Gradečak, and P. Stadelmann, "Influence of the carrier gas composition on morphology, dislocations and microscopic luminescence properties of selectively grown GaN by HVPE", *Journal of Applied Physics* **92**, 1307-1316, 2002.
56. A. Smontara, A. M. Tonejc, S. Gradečak, A. Tonejc, A. Bilušić, and J. C. Lasjaunias, "Structural (XRD and HRTEM) investigations of fullerite C₆₀ and C₇₀ samples", *Materials Science Engineering C* **19**, 21-25, 2002.
57. G. Zgrablić, D. Vinković, S. Gradečak, D. Kovačić, N. Biliškov, N. Grbac, Z. Andreić, and S. Garaj, "Instrumental recording of electrophonic sounds from Leonid fireballs", *Journal of Geophysical Research - Space Physics* **107**, 1124(1-9), 2002.
- Featured in Nature Science Update, Natural History Magazine, New Scientist, BBC online.*
58. A. Smontara, A. Bilušić, J. C. Lasjaunias, M. Saint-Paul, S. Gradečak, A. Mejski-Tonejc, A. Tonejc, N. Kitamura, and S. Bennington, "Thermal and elastic properties of hard carbon", *Strojstvo* **44**, 195-200, 2002.
59. A. Bilušić, S. Gradečak, A. Tonejc, A. T. Tonejc, J. C. Lasajunias, and A. Smontara, "Transport properties of fullerite samples", *Synthetic Metals* **121**, 1121-1122, 2001.

Conference Proceedings

60. J. Chesin, X. Zhou, S. Gradečak, "Light extraction in individual GaN nanowires on Si for LEDs", *Proceeding of SPIE 8467*, 846703, 2012.
61. M. J. Tambe, L. F. Allard, S. Gradečak, "Characterization of core-shell GaAs/AlGaAs nanowire heterostructures using advanced electron microscopy", *Proceedings of the 16th Conference on Microscopy of Semiconducting Materials*, Cambridge, United Kingdom, March 17-April 20, 2009, published in *Journal of Physics: Conference Series* **209**, 012033(1-4), 2010.
62. B. K. Newman, J. T. Sullivan, M. T. Winkler, M. J. Sher, M. A. Marcus, S. Fakra, M. J. Smith, S. Gradečak, E. Mazur, "Illuminating the Mechanism for Sub-Bandgap Absorption in Chalcogen Doped Silicon Materials for PV Applications", *Proceedings of the 24th European Photovoltaic Solar Energy Conference*, 236-238, 2009.
63. J. Napierala, D. Martin, H. J. Buhlmann, S. Gradečak, and M. Ilegems, "GaN laterally overgrown on sapphire by low pressure hydride vapor phase epitaxy", *Proceedings of the 10th International Conference on Silicon Carbide and Related Materials 2003*, Lyon, France, October 5-10, 2003, published in *Materials Science Forum*, Part 2 **457-460**, 1581-1584, 2004.
64. S. Gradečak, M. Albrecht, H. P. Strunk, D. Martin, J. Napierala, M. Ilegems, P. Stadelmann, "Microstructure and optical properties of ELO-GaN layers grown by hydride vapor phase epitaxy", *Proceedings of the 13th Conference on Microscopy of Semiconducting Materials*, Cambridge, United Kingdom, March 31-April 3, 2003, published in *Institute of Physics Conference Series* **180**, 321-324, 2003.

65. S. Gradečak, V. Wagner, M. Ilegems, F. Bobard, P. Stadelmann, "Microstructure of ELO-GaN Layers Grown by Hydride Vapour Phase Epitaxy", Proceedings of the Materials Research Society 2001 Fall Meeting, Boston, MA, November 26-31, 2002, MRS Proceedings 693, I3.23(1-6), 2001.

Other Major Publications

66. S. Crawford, "Synthesis of III-V nitride nanowires with controlled structure, morphology, and composition", student-supervised PhD Thesis, MIT 2012

67. M. Smith, "Femtosecond-laser irradiation as a platform for tailoring the optoelectronic properties of silicon", student-supervised PhD Thesis, MIT 2012

68. M. Brewster, "The interplay of structure and optical properties in individual semiconducting nanostructures", student-supervised PhD Thesis, MIT 2011

69. S. K.Lim, "III-V Nanowires: From Fundamental Growth Models to Novel Architectures", student-supervised PhD Thesis, MIT 2011

70. M. Tambe, "Controlled Growth and Doping of Core-shell GaAs-based Nanowires", student-supervised PhD Thesis, MIT 2010

71. S. Gradečak, "Structural and optical properties of laterally overgrown gallium nitride studied by electron microscopy", PhD Thesis, Swiss Federal Institute of Technology in Lausanne, 2003.

PATENTS

1. S. Gradečak, C. H. Tseng, M. J. Tambe, M. J. Smith, "Nanowire synthesis", U.S. Patent No. 8269257, Issue date 09/08/2012

2. S. Gradečak, C. H. Tseng, S. K. Lim, "Nanoparticle synthesis", U.S. Patent No. 8389393, Issue date 03/05/2013

3. S. Gradečak, C. H. Tseng, S. K. Lim, "Nanoparticle synthesis", International Patent Application No. PCT/US2010/042942, July 2010

4. S. Gradečak, C. H. Tseng, M. J. Tambe, M. J. Smith, "Nanowire synthesis", International Patent Application No. PCT/US2010/042945, July 2010

5. H. Park, S. Chang, J. Kong, S. Gradečak, "Nanowire-modified graphene and methods of making and using same", U.S. provisionally patent No. 61/729,795 filed on 11/26/2012

6. H. Park, S. Chang, J. Kong, T. Palacios, S. Gradečak, "High-efficiency graphene-based flexible organic solar cells, U. S. Patent application No. 61/902,931 filed on 11/12/2013

INVITED PRESENTATIONS

February 2014, TBD, Materials Challenges In Alternative & Renewable Energy Conference, Clearwater, FL.

February 2014, TBD, Photonics West, San Francisco, CA.

December 2013, TBD, International Semiconductor Device Research Symposium, Bethesda, MD

October 2013, "III-V nanowires: from LEDs to solar cells", 30th North American Conference on Molecular Beam Epitaxy, Banff, CANADA

September 2013, "Nanowire LEDs" Fall 2013 American Chemical Society National Meeting, Indianapolis, IN.

August 2013, "Efficiency of III-nitride light-emitting diodes", SPIE Optics and Photonics, San Diego, CA.

April, 2013, “Emerging nanomaterials for photovoltaic energy harvesting”, SPIE Defense Security and Sensing, Baltimore, MD.

April 2013, “Inovation-driven research”, WinDays, Umag, CROATIA.

April 2013, “Nanowires: from growth to applications”, Case Western University, Cleveland, OH.

September 2012, “Understanding the growth of III-V nanowires”, NANOWIRES 2012, Paul-Drude-Institut, Berlin, Germany

August 2012, “Nanomaterials for energy applications”, Fall 2012 American Chemical Society National Meeting, Philadelphia

August 2012, “Nanowire-based solar cells”, SPIE Optics and Photonics, San Diego

June 2012, “Hybrid organic/inorganic bulk heterojunction solar cells”, From Solid State to BioPhysics VI, Dubrovnik, Croatia

April 2012, “Nanostructured materials for energy applications”, NATO Advanced Research Workshop: Multidisciplinary Endeavour in Nanobiology, Nanoscience and Environment, Split, Croatia

”Semiconductor Nanowires for Energy Applications”:

March 2012, Lawrence Livermore National Laboratory, Livermore

March 2012, University of California, Berkeley

March 2012, Stanford University, Stanford

March 2012, Swiss Federal Institute of Technology, Lausanne, Switzerland

April 2012, University of Michigan, Ann Arbor

April 2012, University of Illinois, Urbana-Champaign

December 2011, “III-V Nanowires for Energy Applications”, Workshop On Frontiers in Electronics, San Juan, Puerto Rico.

October 2011, “Controlled growth of III-V nanowires for energy applications”, 220th ECS Meeting, Boston

September 2011, “Semiconductor nanowires for energy applications”, Sandia National Laboratory, Albuquerque

August 2011, "III-V nanowires and nanowire heterostructures: controlling the growth and nanoscale properties", SPIE Optics and Photonics, San Diego

June 2011, “Controlled growth and doping of III-V nanowires”, NANOWIRES 2011, Lesvos, Greece

June 2011, “Semiconductor nanowires for energy applications”, International Conference on Materials for Advanced Technologies, Singapore

May 2011, “Frontiers of nanotechnology: semiconductor nanowires”, Karlsruhe Institute of Technology, Karlsruhe, Germany

May 2011, “Nanowire based photonics and electronics”, Laser Seminar, ETHZ, Zürich, Switzerland.

April 2011, “Controlling the structure and properties of semiconductor nanowires: from growth to applications”, Brookhaven National Laboratory, Upton

October 2010, “High-resolution optical studies of nanomaterials”, 6th International Workshop on Nano-Scale Spectroscopy and Technology, Kobe, Japan

July 2010, “Nanowire lasers and nanophotonic sources”, Optical Society of America: Integrated Photonics Research, Silicon and Nano Photonics Topical Meeting, Monterey, California

June 2010, “Frontiers of nanotechnology: semiconductor nanowires”, EPFL, Lausanne, Switzerland

June 2010, “Frontiers of nanotechnology: semiconductor nanowires”, From Solid State to BioPhysics V, Dubrovnik, Croatia

May 2010, “Semiconductor nanowires: from LEDs to solar cells”, Center for Excitonics, MIT

October 2009, “Semiconductor nanowires: growth, properties, and applications”, National Institute for Materials Science, Tsukuba, Japan

September 2009, “Cathodoluminescence in scanning transmission electron microscopy: direct Correlation between optical and structural properties on the nanoscale”, Frontiers of Electron Microscopy for Materials Science 2009, Sasebo/Nagasaki, Japan

September 2009, “Semiconductor nanowires: growth, properties, and applications”, Schlumberger, Cambridge

May 2009, "Atomically-resolved Z-contrast imaging of nanowire heterostructures: unique properties and applications", Oak Ridge National Laboratory, Tennessee

December 2008, “Controlled growth and characterization of III-V nanowire heterostructures”, Materials Research Society Fall Meeting 2008, Boston

September 2008, “Aberration-corrected Z-contrast imaging of nanowires: from structural characterization toward novel applications”, Oak Ridge National Laboratory, Tennessee

September 2008, “Wavelength-controlled nanowire lasers for optical interconnects”, Semiconductor Research Corporation, Interconnect Focus Center Seminar (web-based presentation)

November 2007, “Semiconductor nanowires for nanoscale photonics and electronics”, 3M, Minneapolis

October 2007, “Semiconductor nanowires: synthesis and applications”, MEMS@MIT, MIT

October 2007, “Semiconductor nanowires for nanoscale photonics and electronics”, Optics and Quantum Electronics Seminar, MIT

October 2007, “Semiconductor nanowires for nanoscale photonics and electronics”, Microsystems Technology Laboratories, MIT

May 2007, “Semiconductor nanowires for photonics and electronics”, Institute of Physics, Zagreb, Croatia

May 2007, “Electron microscopy of semiconductor nanowire heterostructures”, 2007 Woods Hole Spring Symposium of the New England Society for Microscopy

October 2006, “Science on the nanoscale: materials, methods and applications”, Massachusetts Institute of Technology, Microphotonics Center 2006 Fall Meeting

“Gallium nitride - based nanowires for nanoscale photonics and electronics”:

January 2006, University of Delaware, Department of Materials Science and Engineering

January 2006, University of South Carolina, USC NanoCenter

January 2006, Swiss Federal Institute of Technology, Lausanne, Switzerland, School of Basic Sciences and School of School of Engineering

January 2006, UC Davis, Department of Chemical Engineering and Materials Science

February 2006, Johns Hopkins University, Department of Materials Science and Engineering

February 2006, University of Illinois at Chicago, Department of Physics

February 2006, Columbia University, Department of Applied Physics and Applied Mathematics

February 2006, Rice University, Department of Electrical and Chemical Engineering

February 2006, University of North Carolina at Chapel Hill, Physics Department

February 2006, Massachusetts Institute of Technology, Department of Materials Science and Engineering

March 2006, Rochester University, Physics Department

January 2005, “GaN-based nanowires for photonic applications”, Swiss Federal Institute of Technology, Lausanne, Switzerland

January 2004, “Advanced electron microscopy techniques: direct correlation of optical and structural properties of GaN”, Joint seminar of Institute of Physics in Zagreb and Department of Physics, University of Zagreb, Croatia