

Philip D. Rack

Joint Faculty
Dept. of Materials Science and Engineering
University of Tennessee–Knoxville
Center for Nanophase Materials Sciences
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Education

Georgia Institute of Technology, Atlanta	Materials Science & Engineering	B.S., 1993
University of Florida, Gainesville	Materials Science & Engineering	Ph.D., 1997

Professional Experience

2011 – Present	Leonard G. Penland Chair of the College of Engineering
2010 – Present	Full Professor, Department of Materials and Engineering, University of Tennessee–Knoxville
2005 – 2010	Associate Professor, Department of Materials and Engineering, University of Tennessee–Knoxville
2001 – 2005	Assistant Professor, Department of Materials and Engineering, The University of Tennessee–Knoxville
1998 – 2001	Assistant Professor, Department of Microelectronic Engineering, Rochester Institute of Technology, Rochester, NY
1998 – 2001	Advisory Scientist, Advanced Vision Technologies, Inc., West Henrietta, NY
1997 – 1999	Senior Research and Development Engineer, Advanced Vision Technologies, Inc, West Henrietta, NY

Professional and Synergistic Activities

2005 – Present	Joint Faculty Appointment, Center for Nanophase Materials Science, ORNL
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Honors and Awards

2011 Leonard G. Penland Chair of the College of Engineering
2011 Chancellor's Award for Research and Creative Achievement
2011 College of Engineering Allen & Hoshall Engineering Faculty Award
2009 University of Tennessee College of Engineering Research Fellow Award
2009 Department of Materials Science and Engineering Faculty Research Award
2007 University of Tennessee College of Engineering Research Fellow Award
2006 University of Tennessee College of Engineering Research Fellow Award
2005 Best Poster Award: Microscopy and Microanalysis National Meeting
2005 Best Poster Award: National Materials Research Society Spring Meeting
2003 Ralph E. Powe Junior Faculty Achievement Award
2003 University of Tennessee College of Engineering Outstanding Young Teacher Award
2002 Georgia Institute of Technology Council of Outstanding Young Engineering Alumni
1997 AVS National Graduate Research Award
1995 MRS National Graduate Student Award
1997 AVS Graduate Student Poster Award
1995 AVS Graduate Student Poster Award
1993 Graduated *Magna Cum Laude* in Materials Science and Engineering, GIT

Publications Author of >100 articles in refereed journals including 5 invited reviews and 2 book chapters
Full publication list follows CV.

Research Synopsis

1. Nanoscale self and directed assembly/organization of metallic nanoparticles for advanced functionality.
We are studying the dynamics of liquid phase instabilities and transport of metallic thin films and nanostructures as a means to organize nanoparticle ensembles. The program combines unique experimental studies with both continuum and molecular dynamics simulations to understand the relevant nanoscale time and length scales.
2. Combinatorial thin film synthesis
Using a specially designed thin film sputtering approach, we are use combinatorial thin film deposition to synthesize material libraries for rapid materials discovery. We have studied many different material properties including electronic, optical, catalytic, mechanical, and glass forming ability.
3. Nanoscale device synthesis and integration
Leveraging our extensive experience in nanoscale materials synthesis and nanofabrication, we facilitate new complex device designs for advanced functional materials and devices. More recently we have studied paralleled arrays of vertically aligned nanostructures for intracellular and neuronal probes as well as a new active matrix thin film transistor array coupled with electrofluidic cells for an advanced microfluidic platform.
4. Nanoscale electron/ion/photon beam induced synthesis
In this program we study critical mechanisms involved in particle (electron/ion/photon)-adsorbate-solid interactions to unravel pathways that lead to beam induced synthesis. We combine advanced synthesis methods and characterization techniques with both continuum and Monte-Carlo simulations with the goal of developing new routes for advanced functional nanoscale materials synthesis.

Graduate and Postdoctoral Advisors:

Graduate Advisor: Dr. Paul H. Holloway (University of Florida)

Thesis Advisor and Postgraduate-Scholar Sponsor:

Lena Zavyalova (MS, Motorola), Yuepeng Deng (PhD, Vitek Corporation) Stephen Randolph (MS, PHD, FEI Inc.), Seung-Ik Jun (PhD, PSM America), Yifei Zhang (PhD, ORNL), Daryl Smith (PhD, DAS Freelance), *Ryan Rucker (MS, Micron), Jung Won Park (PhD, Dpix), Matthew Lassiter (PhD, Aegis Technologies), Seyeoul Kwon (LG Electronics), Jon Peak (resident post-doc), *Yueying Wu, *Jiyong Noh, *Siwei Tsang, *Carlos Gonzalez, *Daniel Schaeffer, *Shaofang Fu.

Post Doc Advisees (5 total) *denotes current – Jason D. Fowlkes (ORNL), Yinfeng Guan (Dpix), *Joo Hyon Noh, *Nicholas Roberts, * Daryl Smith

Total Graduate Students Advised: 17

Total Postdoctoral Scholars Advised: 5

Publications

Philip D. Rack, Ph. D.

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Invited Book Chapter

1. **Philip D. Rack**, Andrew J. Steckl and Jason C. Heikenfeld, "Inorganic Electroluminescent Displays," The Handbook of Luminescence and Display Materials and Devices Edited by B.R. Vaddi and H.S. Nalwa, American Scientific Publishers (2003).
2. James M. Fitz-Gerald, **Philip D. Rack**, Bradly Ringeisen, Daniel Young, Rohit Modi, Ray Auyeung, Huey-Daw Wu, "Matrix Assisted Pulsed Laser Evaporation Direct Write (MAPLE DW): A new Method to Rapidly Prototype Organic and Inorganic Materials," Direct Write Technologies for Rapid Prototyping Applications of Sensors, Electronics, and Integrated Power Sources, Edited by Alberto Piqué and Douglas B. Chrisey, Academic Press (2002).

Invited Review Articles

1. Anatoli V Melechko, Ramya Desikan, Timothy E McKnight, Kate L Klein and **Philip D Rack**, *Synthesis of Vertically Aligned Carbon Nanofibers to Interface with Live Systems*, Journal of Physics D: Applied Physics Vol. 42 no. 19 Art. No:193001 (pp. 1-28) (October 2009).
2. K.L. Klein, A.V. Melechko, T.E. McKnight, J.D. Fowlkes, S.T. Retterer, **P.D. Rack**, D. Joy and M.L. Simpson, "Surface Characterization and Functionalization of Carbon Nanofibers" Applied Physics Reviews (Journal of Applied Physics) 103, 061301, pp. 1-26 (March 2008). Also selected for publication for the March 31, 2008 issue of Virtual Journal of Nanoscale Science & Technology.
3. Steven J. Randolph, Jason D. Fowlkes, **Philip D. Rack**, *Focused, Nanoscale Electron-Beam-Induced Deposition and Etching*, Critical Reviews of Solid State and Materials Sciences, Vol. 31, p. 55-89 (October 2006)
4. **Philip D. Rack** and Paul H. Holloway, *The Structure, Device Physics, and Materials Properties of Thin Film Electroluminescent Displays*, Materials Science and Engineering Reports Volume R21, p171-220 (Jan. 1998).
5. **Philip D. Rack**, Ananth Naman, Paul H. Holloway, Sey-Shing Sun, Richard T. Tunge, *Materials Used in Electroluminescent Displays*, MRS Bulletin vol. 21 no. 3 p. 49-58 (March 1996).

Refereed Journal Articles

1. Joo Hyon Noh, Jiyong Noh, Eric Kreit, and Jason Heikenfeld, Philip D. Rack, *Toward active-matrix lab-on-chip: programmable electrofluidic control enabled by arrayed oxide thin film transistors*, Lab on Chip (submitted 8/2011).
2. Harald Plank, Daryl A. Smith, Thomas Haber, Philip D. Rack, and Ferdinand Hofer, *Fundamental Proximity Effects in Focused Electron Beam Induced Deposition*, ACS Nano (submitted 8/2011)
3. Yueying Wu, Nicholas A. Roberts, Jason D. Fowlkes, Javier A. Diez, Lou Kondic, Alajandro Gonzalez, **Philip D. Rack**, *Competing liquid phase instabilities during pulsed laser induced self-assembly of copper rings into ordered nanoparticle arrays on SiO₂*, Langmuir (accepted 9/11).

4. P. F. A. Alkemade, H. Miro, E. van Veldhoven, D. Maas, D. A. Smith, **P. D. Rack**, *Pulsed helium ion beam induced deposition: a means to high growth rates*, J. Vacuum Science and Technology (accepted 9/11).
5. Takeshi Nagase, Satoshi Anada, Philip D. Rack, Joo Hyon Noh, Hidehiro Yasuda, Hirotaro Mori, and Takeshi Egami, *Electron irradiation–induced crystallization of an amorphous phase in Zr-Hf-Nb alloy*, Acta Materialia (submitted 3/11).
6. Joo Hyon Noh, Seung Yoon Ryu, Sung Jin Jo, Chang Su Kim, Philip D. Rack, and Hong Koo Baik, *Transparent thin-film transistor device with indium oxide channel layer deposited at room temperature: A promising candidate for transparent and flexible electronics*, Japanese Journal of Applied Physics (submitted 8/2011).
7. Takeshi Nagase, Satoshi Anada, Philip D. Rack, Joo Hyon Noh, Hidehiro Yasuda, Hirotaro Mori, and Takeshi Egami, *MeV electron irradiation-induced structural change in an approximately equiatomic concentration Zr-Hf-Nb alloy*, Intermetallics (submitted 4/11).
8. Miguel Fuentes-Cabrera¹, Bradley H. Rhodes, Michael I. Baskes, Humberto Terrones, Jason D. Fowlkes, Michael L. Simpson, and Philip D. Rack, *Controlling the velocity of jumping nanodroplets via their initial shape and temperature*, ACS Nano vol. 5 no. 9 pp 7130-7136 (Sept, 2011).
9. J. D. Peak, C.L. Melcher, P.D. Rack, *Investigating the luminescence properties as a function of activator concentration in single crystal cerium doped Lu₂SiO₅: Determination of the configuration coordinate model*, Journal of Applied Physics vol. 110 no. 1 pp. 013511(1-11) (July 2011).
10. Jason D. Fowlkes, Yueying Wu, Javier Diez, Lou Kondic, Philip D. Rack, *Self– versus Directed– assembly of Nanoparticles via Pulsed Laser Induced Dewetting of Patterned Metal Films*, Nano Letters vol. 11 no. 6 pp. 2478-2585(June 2011).
11. Miguel Fuentes-Cabrera, Bradley H. Rhodes, Jason D. Fowlkes, Alejandro López-Benzanilla, Humberto Terrones, Michael L. Simpson, and Philip D. Rack, *Molecular dynamics study of the de-wetting of copper on graphite and graphene: implications for nanoscale self-assembly*, Physical Review E vol. 83 pp. 041603(1-10) (April 2011).
12. Yueying Wu, Jason D. Fowlkes, **Philip D. Rack**, *The Optical Properties of Cu-Ni Nanoparticles Produced via Pulsed Laser Dewetting of Ultrathin Films: The Effect of Nanoparticle Size and Composition on the Plasmon Response*, Journal of Materials Research Vol. 26 no 2 pp. 277-287 (January 2011).
13. Seyeoul Kwon, Joo Hyon Noh, Jiyong Noh, and **Philip D. Rack**, *Quantitative Calculation of Oxygen Incorporation in Sputtered IGZO Films and the Impact on Transistor Properties*, Journal of the Electrochemical Society, Vol. 158 no 3, pp. H289-H293 (January 2011).
14. Raphael Clearfield, Justin G. Railsback , Ryan C. Pearce, Dale K. Hensley, Jason D. Fowlkes, Miguel Fuentes-Cabrera, Michael L. Simpson, **Philip D. Rack**, Anatoli D. Melechko, *Reactive solid-state dewetting of Cu-Ni films on silicon*, Applied Physics Letters Vol. 97 pp. 253101(1-3) (December 2010). **Also selected for publication for the January 3, 2010 issue of Virtual Journal of Nanoscale Science & Technology.**
15. Ping Chen, Emile van Veldhoven, Colin Sanford, Huub Salemink, Diederik Maas, Daryl A. Smith, **Philip D. Rack**, and Paul Alkemade, *Nanopillar growth by focused helium ion beam induced deposition*, Nanotechnology Vol. 21 no. 45, 455302 (1-7) (November 2010).
16. Elena Garlea, Hahn Choo, Gongyao Wang, Peter Liaw, Bjorn Clausen, Donald Brown, Jungwon Park, **Philip D. Rack**, and Edward Kenik, *Hydride-phase formation and its influence on fatigue crack propagation behavior in a Zircaloy-4 alloy*, Metallurgical and Materials Transactions A-Physical Metallurgy and Materials Science, Vol. 41A no. 11 pp. 2816-2828 (November 2010).
17. Joo Hyon Noh, Maxim Nikiforov, Sergei V. Kalinin, Alexey A. Vertegel, **Philip D. Rack** *Nanofabrication of Insulated scanning probe microscopy for electromechanical imaging in liquid solutions*, Nanotechnology Vol. 21 no.36 pp. 365302 (11pp) (September 2010).
18. Yueying Wu, Jason D. Fowlkes, **Philip D. Rack**, Lou Kondic, Javier A. Diez, *On the Breakup of Patterned Nanoscale Copper Rings into Droplets Via Pulsed Laser Induced*

- Dewetting: Competing Liquid Phase Instability and Transport Mechanisms*, Langmuir Vol. 26 no. 14 pp.11972-11979 (July 2010).
19. Jason D. Fowlkes, Yueying Wu, **Philip D. Rack**, *Directed assembly of Bi-Metallic Nanoparticle by Pulsed Laser Induced Dewetting: A Unique time and length scale regime*, ACS Applied Materials and Interfaces Vol. 2 no. 7 pp. 2153-2161 (July 2010).
 20. J. D. Peak, C.L. Melcher, **P.D. Rack**, *Combinatorial thin film sputtering investigation of cerium concentration in Lu₂SiO₅ scintillators*, Journal of Luminescence Vol. 130 no. 8 pp. 1366-1370 (August 2010).
 21. Chul-Ho Kim, Seyeoul Kwon, Jae Hoon Bahn, Keunho Lee, Seung Ik Jun, Philip D. Rack, Seung Joon Baek, *Effects of atmospheric non-thermal plasma on invasion of colorectal cancer cells*, Applied Physics Letters Vol. 96 no. 24 pp. 243701 (1-3) (June 2010). **Also selected for publication in the Journal of Biological Physics Research.**
 22. Joo Hyon Noh, Seung Yoon Ryu, Sung Jin Jo, Chang Su Kim, Sung-Woo Sohn, **Philip D. Rack**, Dong-Joo Kim, and Hong Koo Baik, *Indium Oxide Thin-Film Transistors Fabricated by RF-Sputtering at Room Temperature*, Electron Device Letters Vol. 31 no. 6 pp. 567-569 (June 2010).
 23. Qiang Guo, Joo Hyon Noh, Peter K. Liaw, **Philip D. Rack**, Yi Li, Carl V. Thompson, *Density change upon crystallization in amorphous Zr-Cu-Al thin films*, Acta Materialia vol. 58 no. 10, pp. 3633–3641 (June 2010).
 24. D.A. Smith, D.C. Joy, **P.D. Rack**, *Monte Carlo Simulation of Helium Ion Beam Induced Deposition*, Nanotechnology Vol. 21 no. 17 pp. 175302 (8pp) (April 2010).
 25. Jason D. Fowlkes and **Philip D. Rack**, *Fundamental electron-precursor–solid interactions derived from time dependent electron beam induced deposition simulations and experiments*, ACS Nano Vol. 4 No. 3 pp.1619–1629 (April 2010).
 26. J.D. Fowlkes, M. J. Doktycz and **P.D. Rack**, *An optimum nanoparticle separator enabled by electron beam induced deposition*, Nanotechnology Vol.21 no. 16 pp.165303 (9pp) (April 2010). ***Image selected for Journal Cover.**
 27. M. Dhindsa, J. Heikenfeld, S. Kwon, J. Park, P.D. Rack, I. Papautsky, *Virtual electrowetting channels: electronic liquid transport with continuous channel functionality*, Lab-on-Chip Vol. 10, pp. 832-836 (March 2010). ***Image selected for Journal Cover.**
 28. K. Yang, C.L. Melcher, **P.D. Rack**, Eriksson L.A. *Effects of Calcium Codoping on Charge Traps in LSO:Ce Crystals*, IEEE Transactions on Nuclear Science, Vol. 56 no.5 pp 2960-2965 (October 2009).
 29. F.X. Liu, F.Q. Yang, Y.F. Gao, W.H. Jiang, Y. Guan, P.D. Rack, O. Sergic, P.K. Liaw, *Micro-Scratch Study of a Zr-Based Metallic-Glass Film*, Surface and Coatings Technology Vol 203, no. 22 pp.3480-3484 (August 2009).
 30. Seyeoul Kwon, Jungwon Park, **Philip D. Rack**, *Device characteristics of amorphous indium gallium zinc oxide TFTs sputter deposited with different substrate bias*, Electrochemical and Solid State Letters Vol. 12 no. 7 pp.H-278-280 (May 2009).
 31. Jungwon Park, Seyeoul Kwon, Seung-Ik Jun, Ilia N. Ivanov, Jinbo Cao, Janice L. Musfeldt, **Philip D. Rack**, *Stress induced crystallization of hydrogenated amorphous silicon*, Journal of Thin Solid Films Vol. 517 no. 11 pp. 3222-3226 (April 2009).
 32. Jungwon Park, Seyeoul Kwon, Seung Ik Jun, Timothy E. Mcknight, Anatoli V. Melechko Michael L. Simpson, Manjeet Dhindsa, Jason D. Heikenfeld, and **Philip D. Rack**, *Active Matrix Thin Film Transistor Microelectrode Array Integrated with Vertically Aligned Carbon Nanofibers*, Electron Device Letters Vol. 30, No. 3, pp. 254-257 (March 2009).
 33. L. Kondic, J.A. Diez, **P.D. Rack**, Y. Guan, J.D. Fowlkes, *Nanoparticle assembly via the dewetting of patterned thin metal lines: Understanding the instability mechanisms*, Physical Review E **79 no 2**, 026302 pp.1-7 (February 2009). Also selected for publication for the February 16, 2009 issue of Virtual Journal of Nanoscale Science & Technology.
 34. Y.F. Guan, J.D. Fowlkes, S.T. Retterer, M.L. Simpson, **P.D. Rack**, *Nanoscale Lithography via Electron Beam Induced Deposition*, Nanotechnology 19 505302 pp.1-6 (November, 2008).

35. Matthew G. Lassiter and **Philip D. Rack**, *Nanoscale Electron Beam Induced Etching (EBIE): A Continuum Model that Correlates the Etch Profile to the Experimental Parameters*, Nanotechnology 19 no. 45 455306 pp.1-14 (November 2008).
36. Daryl A. Smith, Jason D. Fowlkes, **Philip D. Rack**, *Simulating the Effects of Surface Diffusion on Electron Beam Induced Deposition via a Three Dimensional Monte Carlo Simulation*, Nanotechnology Vol. 19, no. 14, 415704 pp. 1-11 (October 2008).
37. Daryl A. Smith, Jason D. Fowlkes, **Philip D. Rack**, *Understanding the Kinetics and Nanoscale Morphology of Electron Beam Induced Deposition via a Three Dimensional Monte Carlo Simulation: The Effects of the Precursor Molecule and the Deposited Material*, Small, Vol. 4, No. 9, pp. 1382–1389 (September 2008).
38. K. D. Sorge, K. L. Klein, A. V. Melechko, C. L. Finkel, O. Malkina, Th. Leventouri, J. D. Fowlkes, **P. D. Rack**, M. L. Simpson, *Magnetic Properties of Fe-Co Catalysts Used for Carbon Nanofiber Synthesis*, Journal of Applied Physics Vol. 104 033909 pp. 1-7 (August 2008).
39. Yingfeng Guan, Xingwu Wang, Yuandan Liu, Michael D. Potter, Korey D. Sorge, **Philip D. Rack**, *Combinatorial synthesis and characterization of magnetic $Fe_xAl_{1-x}ON$ thin films*, Thin Solid Films vol. 516 pp. 6063-6070 (August 2008).
40. Kate L. Klein, Steven J. Randolph, Lawrence F. Allard, Harry M. Meyer III, Michael L. Simpson, and **Philip D. Rack**, *Single Crystal Nanowires Grown Via Electron Beam Induced Deposition*, Nanotechnology **19** 345705 pp.1-8 (July 2008).
41. **P.D. Rack**, Y.F. Guan, J.D. Fowlkes, A.V. Melechko, M.L. Simpson, *Pulsed Laser Dewetting of Patterned Thin Metal Films: A Means of Directed Assembly*, Applied Physics Letters, vol. 92 no. 22, 223108 pp.1-3 (June 2008).
42. Jonathan D. Peak, Charles L. Melcher, **Philip D. Rack**, *Combinatorial thin film synthesis of cerium doped scintillation materials in the lutetium oxide – silicon oxide system*, IEEE Transactions on Nuclear Science vol. 5 no.3 pt.2 pp. 1480-1483 (June 2008).
43. Matthew G. Lassiter, Ted Liang, **Philip D. Rack**, *Electron Beam Induced Etching for Nanoscale Repair of Extreme Ultraviolet Lithography Masks*, Journal of Vacuum Science and Technology B, vol. 26 no. 3 pp. 963-967 (May-June 2008).
44. Y.F. Guan, R.C. Pearce, A.V. Melechko, D.K. Hensley, M.L. Simpson, **P.D. Rack**, *Pulsed laser de-wetting of nickel catalyst for carbon nanofiber growth*, Nanotechnology **19** 235604 pp.1-4 (June 2008).
45. Chang K. Choi, Chuck A. Hargraves, Seung-Ik Jun, **Philip D. Rack**, Anthony E. English, Kenneth D. Kihm, *Opto-Electric Cellular Biosensor Using Optically Transparent Indium Tin Oxide (ITO) Electrodes*, Sensors 8, 3257-3270 (May 2008).
46. **Philip D. Rack**, Jonathan D. Peak, Charles L. Melcher, James M. Fitz-Gerald, *Scanning electron and cathodoluminescence imaging of thin film $Lu_2SiO_5:Ce$ scintillating materials*, Applied Physics Letters Vol. **91**, No. 24, 244102 pp. 1-3 (December 2007).
47. F. X. Liu, P. K. Liaw, W. H. Jiang, C. L. Chiang, Y. F. Gao, Y. F. Guan, J. P. Chu, and **P. D. Rack**, *Fatigue-Resistance Enhancements by Glass-Forming Metallic Films*, Materials Science and Engineering: A, Volumes 468-470, 15 pp. 246-252 (November 2007).
48. A.V. Melechko, K.L. Klein, J.D. Fowlkes, D. K. Hensley, I. A. Merkulov, T. E. McKnight, **P.D. Rack**, J. A. Horton, M. L. Simpson, *Control of carbon nanostructure: from nanofiber toward nanotube and back*, Journal of Applied Physics, **102**, 074314, pp. 1-7 (October 2007).
49. S.J. Randolph, J.D. Fowlkes, A. Melechko, K.L. Klein, H.M. Meyer, III, M.L. Simpson, **P.D. Rack**, *Controlling thin film structure for the dewetting of catalyst nanoparticle arrays for subsequent carbon nanofiber growth*, Nanotechnology 18 (2007) 465304 pp.1-8.
50. **Philip D. Rack**, Jason D. Fowlkes, Steven J. Randolph, *In-situ probing of the growth and morphology in electron-beam-induced deposited nanostructures*, Nanotechnology 18 (2007) 465602 pp.1-6.
51. M. Zhang, Y. F. Zhang, **P.D. Rack**, M.K. Miller, T.G. Nieh, *Nanocrystalline Tetragonal Tantalum Thin Films*, Scripta Materialia Vol. 57 pp. 1032–1035 (September 2007).

52. Yuepeng Deng, Yinfeng Guan, Jason D. Fowlkes, S.Q. Wen, George M. Pharr, Fengxiao Liu, Peter K. Liaw, C.T. Liu, **Philip D. Rack**, *A combinatorial thin film sputtering approach for synthesizing and characterizing ternary ZrCuAl metallic glasses*, Intermetallics Volume 15, No. 9, pp. 1208-1216 (September 2007).
53. B.J. Rodriguez, S. Jesse, K. Seal, A.P. Baddorf, S.V. Kalinin, and **P. D. Rack**, *Fabrication, Dynamics, and Electrical Properties of Insulated SPM Probes for Electrical and Electromechanical Imaging in Liquids*, Applied Physics Letters, Vol. 91, No. 9, 093130 pp.1-3 (August 2007). (*Also selected for publication in the September 10, 2007 issue of Virtual Journal of Nanoscale Science & Technology.)
54. Yingfeng Guan, Y.F. Guan Anatoli V. Melechko, Anthony J. Pedraza, Michael L. Simpson, **Philip D. Rack**, *Non-Lithographic Organization of Nickel Catalyst for Carbon Nanofiber Synthesis on Laser-Induced Periodic Surface Structures*, Nanotechnology Vol. 18, No. 33 335306 pp. 1-7 (August 2007). ***Featured Article and image selected for Journal cover**
55. Young R. Choi, **Philip D. Rack**, Bernard Frost, and David C. Joy, *Effect of Electron Beam-Induced Deposition and Etching Under Bias*, Scanning Vol. 29 No. 4 pp. 171-176 (July/August 2007). ***Image selected for Journal Cover.**
56. Daryl A. Smith, Jason D. Fowlkes, **Philip D. Rack**, *A Nanoscale Three – Dimensional Monte Carlo Simulation of Electron Beam Induced Deposition with Gas Dynamics*, Nanotechnology Vol. 18, No. 26 265308 pp. 1-14 (July 2007).
57. Chang K. Choi, Anthony E. English, Seung-Ik Jun, Kenneth D. Kihm, and **Philip D. Rack**, *An endothelial cell compatible biosensor fabricated using optically thin indium tin oxide silicon nitride electrodes*, Biosensors and Bioelectronics Vol. 22, No. 11, 15, pp. 2585-2590 (May 2007).
58. J.D. Fowlkes, **P.D. Rack**, J.M. Fitz-Gerald, *Ultraviolet emitting $(Y_{1-x}Gd_x)_2O_{3-z}$ thin films deposited by rf magnetron sputtering: structure – property – thin film processing relationships*, Thin Solid Films, Vol. 515 no. (7-8) pp. 3488-3498 (February 2007).
59. T. Leventouri, A. V. Melechko, K. D. Sorge, K. L. Klein, J. D. Fowlkes, **P. D. Rack**, I. M. Anderson, J. R. Thompson, T. E. McKnight, M. L. Simpson, *Magnetic Alloys in Nanoscale Biomaterials*, Trans Met A, **37A**, 3423-3427 (December 2006).
60. Yuepeng Deng, Y. Guan, **Philip D. Rack**, *Combinatorial Synthesis and Parameter Optimization of Chromium-doped Yttrium Aluminum Garnet Thin Film Sputtering*, Thin Solid Films, Vol. 515, no. 4, 5 pp. 1721-1726 (Dec 2006).
61. Young R. Choi, **Philip D. Rack**, Steven J. Randolph, Daryl A. Smith, and David C. Joy, *Pressure effect of growing with electron beam induced deposition with WF_6 and TEOS precursor*, Scanning, Vol. 28 no. 6, pp. 3111-3118, (December 2006) ***image selected for journal cover.**
62. Yuepeng Deng, Jason D. Fowlkes, **Philip D. Rack**, James M. Fitz-Gerald, *Thin Film rf Magnetron Sputtering of Gadolinium Doped Yttrium Aluminum Garnet Ultraviolet Emitting Materials*, Journal of Optical Materials Vol. 29 pp.183-191 (November 2006).
63. Manjeet S. Dhindsa, Neil R. Smith, and Jason Heikenfeld, **Philip D. Rack**, Jason D. Fowlkes, Mitchel J. Doktycz, Anatoli V. Melechko, and Micheal. L. Simpson, *Electrostatically Induced Wetting of Vertically Aligned Superhydrophobic Carbon Nanofibers*, Langmuir Vol 22 no. 21, pp. 9030-9034, (October 2006).
64. Seung-Ik Jun, Anatoli V. Melechko, Timothy E. Mcknight, Michael L. Simpson, **Philip D. Rack**, *Low Temperature Solid Phase Crystallization of Amorphous Si Thin Films Deposited with RF Magnetron Sputter Deposition with Substrate Bias*, Applied Physics Letters Vol 89, no. 2, p 22104-1-3 (July 2006).
65. F.X. Liu, P.K. Liaw, G.Y. Wang, C.L. Chiang, D.A. Smith, **P.D. Rack**, J.P. Chu and R.A. Buchanan, *Specimen-geometry effects on mechanical behavior of metallic glasses*, Intermetallics, Vol. 14, no. 8-9, pp. 1014-1018 (August-September 2006).
66. J.D. Fowlkes, **P.D. Rack**, J.M. Fitz-Gerald, *Ultraviolet emitting $(Y_{1-x}Gd_x)_2O_{3-z}$ thin films deposited by rf magnetron sputtering: Combinatorial modeling, synthesis, and rapid characterization*, Thin Solid Films, Vol. 510, no. 1-2, pp. 68-76 (July 2006).

67. J.D. Fowlkes, A.V. Melechko, K.L Klein, **P.D. Rack**, D.A. Smith, D.K. Hensley, M.J. Doktycz, M.L. Simpson, *Control of catalyst particle crystallographic orientation in vertically aligned carbon nanofiber synthesis*, Carbon, Vol 44 no. 8, pp. 1503-1510 (July 2006).
68. K.L. Klein, A.V. Melechko, **P.D. Rack**, D.K. Hensley, J.D. Fowlkes, H.M. Meyer III, L.F. Allard, T.E. McKnight, M.L. Simpson, *Formation of Ultrasharp Vertically Aligned Cu-Si Nanocones by a DC Plasma Process*, Journal of Physical Chemistry B: Condensed Matter, Materials, Surfaces, Interfaces & Biophysical Vol 110 no. (10) pp. 4766-4771 (March 2006).
69. J.D. Fowlkes, S.J. Randolph, **P.D. Rack**, *Growth and Simulation of High – Aspect Ratio Nanopillars by Primary and Secondary Electron – Induced Deposition* Journal of Vacuum Science and Technology B, Microelectronics and Nanometer Structures, Vol 23, no 6, pp 2825-2832 (November/December 2005).
70. E.D. Specht, **P.D. Rack**, A. Rar, G.M. Pharr, E.P. George, J.D. Fowlkes, H. Hong, and E. Karapetrova, *Metastable Phase Evolution and Grain Growth in Annealed Nanocrystalline Cr-Fe-Ni Films*, Thin Solid Films, Vol. 493, Iss. 1-2, pp. 307-312 (December 2005).
71. Seung-Ik Jun, Anatoli V. Melechko, Timothy E. Mcknight, Michael L. Simpson, **Philip D. Rack**, *DC substrate bias effects on amorphous silicon sputter deposited films and integration and characterization of a sputter deposited thin film transistor array*, Applied Physics Letters Vol. 87, No. 13, pp. 132108-1-3 (September 2005).
72. K. L. Klein, A. V. Melechko, **P. D. Rack**, J.D. Fowlkes, H. M. Meyer, and M. L. Simpson, *Cu-Ni composition gradient for the catalytic synthesis of vertically aligned carbon nanofibers*, Carbon Vol. 43, Iss. 9, pp. 1857-1863 (August 2005) ***Image selected for Journal Cover.**
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