

2016 Publications**PEER-REVIEWED PAPERS**

1. Bhupinder Singh, Stacey J. Smith, David S. Jensen, Hodge F. Jones, Andrew E. Dadson, Paul B. Farnsworth, Richard Vanfleet, Jeffrey K. Farrer, Matthew R. Linford "Multi-instrument characterization of five nanodiamond samples: a thorough example of nanomaterial characterization" *Anal. and Bioanal. Chem.* **2016**, *408* (4), 1107 - 1124. DOI: 10.1007/s00216-015-9207-z.
2. Diwan, Anubhav; Singh, Bhupinder; Roychowdhury, Tuhin; Yan, DanDan; Tedone, Laura; Nesterenko, Pavel; Paull, Brett; Sevy, Eric T.; Shellie, Robert; Kaykhali, Massoud; Linford, Matthew R. "Porous, High Capacity, Coatings for Solid Phase Microextraction (SPME) by Sputtering" *Accepted Analytical Chemistry*.
3. Jacob D. Bagley, Dennis H. Tolley, Matthew R. Linford "Reevaluating the Conventional Approach for Analyzing Spectroscopic Ellipsometry Psi/Delta vs. Time Data. Additional Statistical Rigor May Often Be Appropriate." *Accepted Surface and Interface Analysis*.
4. Anubhav Diwan, Bhupinder Singh, Christopher J. Hurley, Matthew R. Linford "Layer-by-Layer deposition of nitrilotris(methylene)triphosphonic acid and Zr(IV): an XPS, ToF-SIMS, Ellipsometry, and AFM study." *Accepted Surface and Interface Analysis*.

BOOK CHAPTERS

5. Cody V. Cushman, Philipp Brüner, Julia Zakel, George Major, Barry M. Lunt, Thomas Grehl, Nicholas J. Smith, and Matthew R. Linford "Low Energy Ion Scattering (LEIS), Part 1. Introduction to its Theory, Instrumentation, and Quantitation". Submitted to *Thin Films in Semiconductor Manufacturing Handbook* by McGraw-Hill.
6. Cody V. Cushman, Philipp Brüner, Julia Zakel, George Major, Barry M. Lunt, Thomas Grehl, Nicholas J. Smith, and Matthew R. Linford "Low Energy Ion Scattering (LEIS), Part 2. Comparison to other Surface Analytical Methods, Static Depth Profiling, and Analysis of Semiconductor Materials, Solid Oxide Fuel Cells, and Catalysts". Submitted to *Thin Films in Semiconductor Manufacturing Handbook* by McGraw-Hill.

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7. Cody V. Cushman, Brandon A. Sturgell, Andrew Martin, Nicholas J. Smith, Matthew R. Linford "Eagle XG® Glass. Optical Constants from 230 – 1690 nm by Spectroscopic Ellipsometry." Submitted to *Surface Science Spectra*.

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8. Cody V. Cushman and Matthew R. Linford 'A (Very Incomplete) Report of AVS 2015' *Vacuum Technology & Coating, January 2016*.
9. Cody V. Cushman, Philipp Br uner, Julia Zakel, George Major, Barry M. Lunt, Thomas Grehl, Nicholas J. Smith, and Matthew R. Linford 'A Pictorial View of LEIS and ToF-SIMS Instrumentation' *Vacuum Technology & Coating, February 2016*.

2015 Publications**PEER-REVIEWED PAPERS**

10. Supriya S. Kanyal, Tim T. Haebe, Cody V. Cushman, Manan Dhunna, Tuhin Roychowdhury, Paul B. Farnsworth, Gertrud E. Morlock, Matthew R. Linford "Microfabrication, separations, and detection by mass spectrometry on ultrathin-layer chromatography plates prepared via the low-pressure chemical vapor deposition of silicon nitride onto carbon nanotube templates" *J. Chrom. A*. **2015**, *1404*, 115 – 123. DOI:10.1016/j.chroma.2015.05.053.
11. Nitesh Madaan, Anubhav Diwan and Matthew R. Linford 'Fluorine plasma treatment of bare and nitrilotris(methylene)triphosphonic acid (NP) protected aluminum: an XPS and ToF-SIMS study'. *Surf. Interface Anal.* **2015**, *47*, 56–62. DOI: 10.1002/sia.5666.
12. Supriya Kanyal, Bhupinder Singh, Daniel Jankowski, Matthew R. Linford 'Hydroxylation of the Silica in Microfabricated Thin Layer Chromatography Plates as Probed by Time-of-Flight Secondary Ion Mass Spectrometry and Diffuse Reflectance Infrared Fourier Transform Spectroscopy'. *Surf. Interface Anal.* **2015**, *47*, 340–344. DOI 10.1002/sia.5713.
13. Cody V. Cushman and Matthew R. Linford "Using the Plan View to Teach Basic Crystallography in General Chemistry" *J. Chem. Ed.* DOI: 10.1021/acs.jchemed.5b00011.
14. Venkatarreddy Udumula, Jefferson H. Tyler, Donald L. Davis, Hao Wang, Matthew R. Linford, Paul S. Minson, David J. Michaelis "A Dual Optimization Approach to Bimetallic Nanoparticle Catalysis: Impact of M1:M2 Ratio and Supporting Polymer Structure on Reactivity" *ACS Catal.* **2015**, *5*(6), 3457–3462, DOI: 10.1021/acscatal.5b00830
15. Chuan-Hsi Hung, Janusz Zukowski, David S. Jensen, Andrew J. Miles, Clayton Sulak, Andrew E. Dadson, Matthew R. Linford "Separation of Cannabinoids on Three Different Mixed-Mode Columns Containing Carbon/Nanodiamond/Amine-Polymer Superficially Porous Particles" *J. Sep. Sci.* **2015**, *38*(17), 2968–2974, DOI: 10.1002/jssc.201500156
16. Diwan, Anubhav; Linford, Matthew "Superhydrophobic Surfaces with very low Hysteresis Prepared by Aggregation of Silica Nanoparticles during in situ Urea-Formaldehyde Polymerization" *Journal of Nanoscience and Nanotechnology*, **2015**, *15*, 10022-10036.
17. Nitesh Madaan, Naomi Romriell, Joshua Tuscano, Helmut Schlaad, Matthew R. Linford "Introduction of Thiol Moieties, including their Thiol-ene Reactions and Air Oxidation, onto Polyelectrolyte Multilayer Substrates" *Journal of Colloid And Interface Science*, **2015**, 199-205 DOI information: 10.1016/j.jcis.2015.08.017
18. Chuan-Hsi Hung, Bhupinder Singh, Michael G. Landowski, Mohammed Ibrahim, Andrew J. Miles, David S. Jensen, Michael A. Vail, Andrew E. Dadson, Stacey J. Smith, Matthew R. Linford "Multi-Instrument Characterization of Poly(Divinylbenzene) Microspheres for Use in

Liquid Chromatography: As Received, Air Oxidized, Carbonized, and Acid Treated” *Surface and Interface Analysis* **2015**, 47, 815 - 823. DOI 10.1002/sia.5713.

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19. Supriya Kanyal; David S. Jensen; Zihua Zhu; Matthew R. Linford ‘Silicon (100)/SiO₂ by ToF-SIMS’. *Surface Science Spectra* **2015**, 22(2), 1 - 6. DOI: 10.1116/1.4930256.
20. Supriya Kanyal; David S. Jensen; Zihua Zhu; Matthew R. Linford ‘Al₂O₃ e-beam evaporated onto silicon (100)/SiO₂ by ToF-SIMS’. *Surface Science Spectra* **2015**, 22(2), 7 - 13. DOI: 10.1116/1.4930928.
21. Supriya Kanyal; David S. Jensen; Zihua Zhu; Matthew R. Linford ‘Thermally evaporated (oxide) iron on an alumina barrier layer by ToF-SIMS’. *Surface Science Spectra* **2015**, 22(2), 14 - 21. DOI: 10.1116/1.4930929.
22. Supriya Kanyal; David S. Jensen; Zihua Zhu; Matthew R. Linford ‘Thermally Annealed Iron Thin Film on an Alumina Barrier Layer by ToF-SIMS’. *Surface Science Spectra* **2015**, 22(2), 22 - 28. DOI: 10.1116/1.4931977.
23. Supriya Kanyal; David S. Jensen; Zihua Zhu; Matthew R. Linford ‘Multiwalled Carbon Nanotube Forest Grown via Chemical Vapor Deposition from Iron Catalyst Nanoparticles by ToF-SIMS’. *Surface Science Spectra* **2015**, 22(2), 29 - 33. DOI: 10.1116/1.4931984.

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24. Blake Dastrup, Barry M. Lunt, Arthur Robbins, Hao Wang, Robert C. Davis, Matthew R. Linford ‘Multiphysics (COMSOL) Modeling of Carbon Nanofuses used as the Fundamental Memory Elements in Long-Lasting Solid State Data Storage Devices’. International Symposium on Optical Memory (ISOM) for the Proceedings of ISOM 2015, Toyama, Japan, Oct. 4 –8, **2015**.

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25. Matthew R. Linford, Andrew E. Dadson, Landon A. Wiest, David S. Jensen U.S. Patent 9,192,915. ‘POROUS COMPOSITE PARTICULAR MATERIALS, METHODS OF MAKING AND USING SAME, AND RELATED APPARATUSES’. Nov. 24, 2015.
26. Matthew R. Linford, Robert C. Davis, Richard R. Vanfleet, David Scott Jensen, Li Yang, Jun Song U.S. Patent No. 9,164,068. ‘Thin layer chromatography plates and related methods.’ Oct. 20, 2015.
27. Matthew R. Linford, Michael A. Vail U.S. Patent No. 9,150,419. ‘Polycrystalline articles for reagent delivery’. Oct. 6, 2015.
28. Matthew R. Linford, David Scott Jensen, Andrew E. Dadson, Robert C. Davis U.S. Patent No. 9,126,227 B2. ‘THIN LAYER CHROMATOGRAPHY PLATES AND RELATED METHODS OF MANUFACTURE INCLUDING PRIMING PRIOR TO INFILTRATION WITH STATIONARY PHASE AND/OR PRECURSOR THEREOF.’ Sept. 8, 2015.
29. Linford, M.R. U.S. Patent No. 9,005,436. ‘Porous composite particulate materials, methods of making and using same, and related apparatuses’. April 14, 2015.

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30. Bhupinder Singh, Ronald Hesse, and Matthew R. Linford 'Good Practices for XPS (and other Types of) Peak Fitting. Use Chi Squared, Use the Abbe Criterion, Show the Sum of Fit Components, Show the (Normalized) Residuals, Choose an Appropriate Background, Estimate Fit Parameter Uncertainties, Limit the Number of Fit Parameters, Use Information from Other Techniques, and Use Common Sense.' *Vacuum Technology & Coating, December 2015.*
31. Cody V. Cushman, Thomas Grehl, and Matthew R. Linford 'Low Energy Ion Scattering (LEIS). V. Static and Sputter Depth Profiling, and Application to Semiconductor Devices.' *Vacuum Technology & Coating, November 2015.*
32. Bhupinder Singh and Matthew R. Linford 'An Introduction to the Equivalent Width and the Autocorrelation Width. Their Possible Applications in XPS Narrow Scan Analysis', *Vacuum Technology & Coating, October 2015.*
33. Hao Wang, David J. Michaelis, Matthew R. Linford 'Surface/Material Analysis of Catalytic Ruthenium-Cobalt Nanoparticles in a Polystyrene Matrix. A Case Study', *Vacuum Technology & Coating, September 2015.*
34. Tuhin Roychowdhury, Cody V. Cushman, George H. Major, Matthew R. Linford 'The Surface Analytical Chemistry (XPS) and Polymer Chemistry of the Acrylates and Methacrylates, an Introduction', *Vacuum Technology & Coating, August 2015.*
35. Cody V. Cushman, Thomas Grehl, and Matthew R. Linford 'Low Energy Ion Scattering (LEIS). IV. Applications to Catalysis.' *Vacuum Technology & Coating, July 2015.*
36. Cody V. Cushman, Thomas Grehl, and Matthew R. Linford 'Low Energy Ion Scattering (LEIS). III. Quantitation in LEIS.' *Vacuum Technology & Coating, June 2015.*
37. Cody V. Cushman, Thomas Grehl, and Matthew R. Linford 'Low Energy Ion Scattering (LEIS). II. Instrumentation and Application to Solid Oxide Fuel Cells' *Vacuum Technology & Coating, May 2015.*
38. Cody V. Cushman, Thomas Grehl, and Matthew R. Linford 'Low Energy Ion Scattering (LEIS). I. The fundamentals.' *Vacuum Technology & Coating, April 2015.*
39. Hao Wang and Matthew R. Linford 'X-ray Photoelectron Spectroscopy and Auger Electron Spectroscopy: Comparison and Basic Principles' *Vacuum Technology & Coating, March 2015.*
40. Cody V. Cushman, George H. Major, and Matthew R. Linford 'A Discussion of Terminology Related to Surface Analysis, and of Sample Preparation, Mounting, and Handling for Surface Sensitive Analytical Methods, as Guided by Three ASTM Standards' *Vacuum Technology & Coating, February 2015.*
41. Anubhav Diwan and Matthew R. Linford 'An Introduction to Classical Least Squares (CLS) and Multivariate Curve Resolution (MCR) as Applied to UV-VIS, FTIR, and ToF-SIMS' *Vacuum Technology & Coating, January 2015.*
42. Anubhav Diwan and Matthew R. Linford 'A Brief Introduction to Matrix Algebra' *Vacuum Technology & Coating, January 2015.*

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43. Hung, C.-H.; Zukowski, J.; Jensen, D.S.; Miles, A.J.; Dadson, A.E.; Linford, M.R. 'FLARE C18 Mixed-Mode Column: Separation of Gensenosides Re and Rd by LC-MS'. *Diamond Analytics Application Note*: DA1016-A.

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45. Bhupinder Singh, Daniel Velásquez, Jeff Terry, Matthew R. Linford. 'The Equivalent Width as a Figure of Merit for XPS Narrow Scans.' *Journal of Electron Spectroscopy and Related Phenomena*. **2014**, *197*, 56 – 63. <http://dx.doi.org/10.1016/j.elspec.2014.06.008>.
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48. Supriya S. Kanyal, David S. Jensen, Andrew E. Dadson, Richard R. Vanfleet, Robert C. Davis, Matthew R. Linford. 'Atomic Layer Deposition of Aluminum-Free Silica onto Patterned Carbon Nanotube Forests in the Preparation of Microfabricated Thin-Layer Chromatography Plates'. *Journal of Planar Chromatography – Modern TLC* **2014**, *27*(3), 151–156. DOI: 10.1556/JPC.27.2014.3.1.
49. Vipul Gupta, Joshua A. Tuscano, Naomi R. Romriell, Robert C. Davis, Matthew R. Linford. "Data and Device Protection: A ToF-SIMS, Wetting, and XPS Study of an Apple iPod Nano". *Surface and Interface Analysis* **2014**, *46*(2), 106–108. DOI: 10.1002/sia.5352.
50. Vipul Gupta, Anubhav Diwan, Delwyn Evans, Clive Telford, Matthew R. Linford "Self-Termination of Gas-Phase Layer-by-Layer Growth of an Aza silane and Water on Planar Silicon and Nylon Substrates" *J. Vac. Sci. Technol. B.* **2014** *32*(6), 061803-1 - 061803-9. <http://dx.doi.org/10.1116/1.4899936>.

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51. Lunt, B.M.; Linford, M.R.; Davis, R.C. 'Permanent Digital Data Storage: An Overview' International Symposium on Optical Memory (ISOM), Oct. 20 – 23, 2014. Hsinchu, Taiwan.

52. Lunt, B.M.; Linford, M.R. 'Current Archiving Technology: An Update' iPRES (International Conference on Preservation of Digital Objects), October 6 – 10, 2014. State Library of Victoria, Melbourne, Australia.
53. Jacob D. Bagley, Hao Wang, Anubhav Diwan, Robert C. Davis, Barry M. Lunt, Matthew R. Linford 'Exploring Sputtered Carbon for the Nanofuses in Solid-State Long-Term Digital Data Storage' International Symposium on Optical Memory (ISOM), Oct. 20 – 23, 2014. Hsinchu, Taiwan.
54. Kevin Laughlin, Hao Wang, Barry M. Lunt, Robert C. Davis, Matthew R. Linford 'Prototyping Permanent Data Storage Elements with Electron Beam Lithography' International Symposium on Optical Memory (ISOM), Oct. 20 – 23, 2014. Hsinchu, Taiwan.
55. Kevin Laughlin, Hao Wang, Barry M. Lunt, Robert C. Davis, Matthew R. Linford 'Preparation and Properties of Carbon Nanofuses for Permanent Data Storage' International Symposium on Optical Memory (ISOM), Oct. 20 – 23, 2014. Hsinchu, Taiwan.
56. Hao Wang, Kevin Laughlin, Jake Bagley, Barry M. Lunt, Robert C. Davis, Matthew R. Linford 'XPS and ToF-SIMS Analysis of the Information Storage Medium of a Permanent Write-Once-Read-Many (WORM) Archival, Solid State Data Storage Device' International Symposium on Optical Memory (ISOM), Oct. 20 – 23, 2014. Hsinchu, Taiwan.
57. Hao Wang, Kevin Laughlin, Jake Bagley, Barry M. Lunt, Robert C. Davis, Matthew R. Linford 'Development of an Optical Model, guided by AFM, for Arc-Deposited Carbon Thin Films in Solid State Data Storage Elements' International Symposium on Optical Memory (ISOM), Oct. 20 – 23, 2014. Hsinchu, Taiwan.

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59. Linford, M.R.; Jensen, D.S.; Dadson, A.E.; Davis, R.C. U.S. Patent No. 8,702,984. 'Thin layer chromatography plates and related methods of manufacture including priming prior to infiltration with stationary phase and/or precursor thereof'. April 22, **2014**.
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62. Anubhav Diwan and Matthew R. Linford 'Models in Ellipsometry: The 'No Model' Model (Just Monitoring Psi and Delta)' *Vacuum Technology & Coating*, November 2014.
63. Matthew R. Linford 'The Blind Men and the Elephant as a Metaphor for the Multi-Instrument Analysis of Surfaces and Materials. Analysis of the Surfaces and Materials in Microfabricated Thin Layer Chromatography Plates' *Vacuum Technology & Coating*, September 2014.
64. Matthew R. Linford 'The Gaussian-Lorentzian Sum, Product, and Convolution (Voigt) Functions Used in Peak Fitting XPS Narrow Scans, and an Introduction to the Impulse Function' *Vacuum Technology & Coating*, July 2014.

65. Matthew R. Linford ‘An Introduction to Convolution with a Few Comments Beforehand on XPS’ *Vacuum Technology & Coating*, June 2014.
66. Matthew R. Linford ‘A Discussion of Aspects of a Paper by Caporali, Bardi, and Lavacchi on LEIS and XPS’ *Vacuum Technology & Coating*, May 2014.
67. Matthew R. Linford ‘An Introduction to Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS)’ *Vacuum Technology & Coating*, April 2014.
68. Matthew R. Linford ‘Understanding One of the Governing Equations of XPS and Highlights from a Recent Paper by Akagawa and Fujiwara’ *Vacuum Technology & Coating*, March 2014.
69. Matthew R. Linford ‘Introduction to Surface and Material Analysis and to Various Analytical Techniques’ *Vacuum Technology & Coating*, Feb. 2014.

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70. Hung, C.-H.; Davis, T.C.; Jensen, D.S.; Miles, A.J.; Zukowski, J.; Dadson, A.E.; Linford, M.R. ‘FLARE C18 Mixed-Mode Column: Alkaloids’. Diamond Analytics Application Note: DA1013-A
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76. Jensen, D.S.; Kanyal, S.S.; Madaan, N.; Miles, A.J.; Davis, R.C.; Vanfleet, R.; Vail, M.A.; Dadson, A.E.; Linford, M.R. “Ozone priming of patterned carbon nanotube forests for subsequent atomic layer deposition-like deposition of SiO₂ for the preparation of microfabricated thin layer chromatography plates.” *J. Vac. Sci. Technol. B* 31(3), May/Jun **2013** 031803-1; <http://dx.doi.org/10.1116/1.4801834>.

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