

2024 Publications

PEER-REVIEWED PAPERS

1. Behnam Moeini, John M. Linford, Neal Gallagher, Matthew R. Linford “Surface Analysis Insight Note. An Example of a Cluster Analysis (CA) of Spectra from an X-ray Photoelectron Spectroscopy Image.” *Surface and Interface Analysis* **2024**, 56(2), 73 – 81.
<http://doi.org/10.1002/sia.7270>.
2. Joshua W. Pinder, George H. Major, Don Baer, Jeff Terry, James E. Whitten, Jan Čechal, Jacob D. Crossman, Alvaro J. Lizarbe, Samira Jafari, Christopher D. Easton, Jonas Baltrusaitis, Mattijs van Sprosen, Matthew R. Linford. “Avoiding Common Errors in X-ray Photoelectron Spectroscopy Data Collection and Analysis, and Properly Reporting Instrument Parameters” Accepted *Applied Surface Science Advances*

ARTICLES IN TECHNOLOGY/TRADE MAGAZINES

3. James N. Hilfiker, Tom Tiwald, and Matthew R. Linford “Analysis of Transparent Thin Films with Infrared Spectroscopic Ellipsometry. Fitting the Refractive Index with the Sellmeier Dispersion Model.” *Vacuum Technology & Coating*, January, 2024.
4. Long Van Le, Young Dong Kim, David E. Aspnes, Matthew R. Linford “Advanced Approaches to Noise Reduction in Spectra.” *Vacuum Technology & Coating*, February, 2024.

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5. Tahereh G. Avval, Stanislav Průša, Cody V. Cushman, Grant T. Hodges, Sarah Fearn, Seong Kim, Jan Čechal, Elena Vaníčková, Pavel Bábík, Tomáš Šikola, Hidde H. Brongersma, and Matthew R. Linford. “A Tag-and-Count Approach for Quantifying Surface Silanol Densities on Fused Silica Based on Atomic Layer Deposition and High-Sensitivity Low-Energy Ion Scattering.” *Applied Surface Science* **2023**, 607, 154551.
6. George H. Major, Joshua Pinder, Daniel E. Austin, Donald R. Baer, Steven L. Castle, Jan Čechal, B. Maxwell Clark, Hagai Cohen, Jonathan Counsell, Alberto Herrera-Gomez, Seong H. Kim, David J. Morgan, Robert L. Opila, Cedric J. Powell, Stanislav Průša, Adam Roberts, Mario Rocca, Naoto Shirahata, Tomáš Šikola, Emily F. Smith, Regina C. So, Jennifer Strunk, Andrew Teplyakov, Jeff Terry, Stephen G. Weber, Matthew R. Linford. “Perspective on improving the quality of surface and material data analysis in the scientific literature with a focus on X-ray Photoelectron Spectroscopy (XPS).” *Journal of Vacuum Science & Technology A* **2023**, 41, 038501. <https://doi.org/10.1116/6.0002437>.
7. George H. Major, B. Maxwell Clark, Kevin Cayabyab, Nathan Engel, Christopher D. Easton, Jan Čechal, Donald R. Baer, Jeff Terry, Matthew R. Linford. “Insufficient Reporting of X-ray Photoelectron Spectroscopy Instrumental and Peak Fitting Parameters (Metadata) in the

- Scientific Literature.” *Journal of Vacuum Science & Technology A* **2023**, *41*, 043201. <https://doi.org/10.1116/6.0002714>.
8. Behnam Moeini, Matthew R. Linford. “Surface Analysis Insight Note: Initial, Statistical Evaluation of X-ray Photoelectron Spectroscopy Images.” *Surface and Interface Analysis* **2023**, *55(8)*, 572 - 578. <http://doi.org/10.1002/sia.7218>.
 9. Behnam Moeini, Matthew R. Linford. “Surface Analysis Insight Note: Analysis of X-ray Photoelectron Spectroscopy Images with Summary Statistics.” *Surface and Interface Analysis. Surface and Interface Analysis* **2023**, *55(11)*, 789 - 797. <http://doi.org/10.1002/sia.7248>.
 10. Alvaro J. Lizarbe, George H. Major, Vincent Fernandez, Neal Fairley, and Matthew R. Linford. “Insight Note: X-ray Photoelectron Spectroscopy (XPS) Peak Fitting of the Al 2p Peak from Electrically Isolated Aluminum Foil with an Oxide Layer.” *Surface and Interface Analysis* **2023**, *55(9)*, 651 - 657. <http://dx.doi.org/10.1002/sia.7238>.
 11. Behnam Moeini, Tahereh Avval, Hidde Brongersma, Stanislav Průša, Pavel Bábík, Elena Vaníčková, Brian R Strohmeier, David S Bell, Dennis Eggett, Steven M George, Matthew R Linford. “Area-Selective (Inhibited) Atomic Layer Deposition of ZnO on Si/SiO₂ Using Tris(trimethylamino)methylsilane.” Preprint. 2023-05-26. DOI: 10.20944/preprints202305.2043.v1.
 12. Behnam Moeini, Tahereh G. Avval, Hidde H. Brongersma, Stanislav Prusa, Pavel Bábík, Elena Vaníčková, Brian R. Strohmeier, David S. Bell, Dennis Eggett, Steven M. George, Matthew R. Linford. “Area-Selective Atomic Layer Deposition of ZnO on Si/SiO₂ Using Tris(dimethylamino)methylsilane.” *Materials* **2023**, *16(13)*. <https://doi.org/10.3390/ma16134688>.
 13. Behnam Moeini, Tahereh G. Avval, Neal Gallagher, Matthew R. Linford. “Surface Analysis Insight Note. Principal Component Analysis (PCA) of an X-ray Photoelectron Spectroscopy Image. The Importance of Preprocessing.” *Surface and Interface Analysis* **2023**, *55(11)*, 798 - 807. <https://doi.org/10.1002/sia.7252>.
 14. Behnam Moeini, Joshua W. Pinder, Tahereh G. Avval, Collin Jacobsen, Hidde H. Brongersma, Stanislav Prusa, Pavel Bábík, Elena Vaníčková, Morris D. Argyle, Brian R. Strohmeier, Brian Jones, Daniel Shollenberger, David S. Bell, Matthew R. Linford. “Controlling the Surface Silanol Density in Capillary Columns and Planar Silicon via the Self-Limiting, Gas-Phase Deposition of Tris(dimethylamino)methylsilane, and Quantification of Surface Silanols after Silanization by Low Energy Ion Scattering.” Accepted *J. Chrom. A*.
 15. Behnam Moeini, David T. Fullwood, Paul Minson, Daniel Shollenberger, David S. Bell, Morris D. Argyle, Richard Vanfleet, Matthew R. Linford “Microstructure quantification of oblique angle sputtered porous a-Si thin films as a basis for structure-property relations of solid phase microextraction coatings” Accepted *Surface & Coatings Technology*.
 16. Behnam Moeini, Neal Gallagher, Matthew R. Linford “Surface Analysis Insight Note. Multivariate Curve Resolution (MCR) of an X-ray Photoelectron Spectroscopy Image.” Accepted *Surface and Interface Analysis*. <http://doi.org/10.1002/sia.7260>.
 17. Stanislav Průša, Matthew R. Linford, Elena Vaníčková, Pavel Bábík, Joshua W. Pinder, Tomáš Šíkola, Hidde H. Brongersma “A practical guide to interpreting low energy ion scattering (LEIS) spectra” Accepted *Applied Surface Science*.

BOOK CHAPTER

18. George H. Major, Neal Fairley, Vincent Fernandez, Matthew R. Linford ‘Introduction to Chemical State Analysis by XPS with Examples’ in “APPLICATIONS OF X-RAY PHOTOELECTRON SPECTROSCOPY TO CATALYTIC STUDIES” edited by Spiros Zafeiratos and published by **World Scientific** as part of the *Catalytic Science* book series.

ARTICLES IN TECHNOLOGY/TRADE MAGAZINES

19. Mireille Richard-Plouet, Vincent Fernandez, David Morgan, Solène Béchu, Mark C. Biesinger, Neal Fairley, Delphine Flahaut, Aurélie Girard, Shaoliang Guan, Jonathan Hamon, Mark Isaacs, George H. Major, Emily Smith, Matthew R. Linford. “Recent Workshops on X-ray Photoelectron Spectroscopy (XPS) in Roscoff and Le Croisic, France, and an Upcoming XPS Workshop in South Wales, UK.” *Vacuum Technology & Coating, January, 2023.*
20. Jeremy Vanderslice, James N. Hilfiker, Joshua W. Pinder, and Matthew R. Linford. “Characterization of Porous Thin Films using Ellipsometric Porosimetry, Part 1.” *Vacuum Technology & Coating, February, 2023.*
21. Jeremy Vanderslice, James N. Hilfiker, Joshua W. Pinder, and Matthew R. Linford. “Characterization of Porous Thin Films using Ellipsometric Porosimetry, Part 2.” *Vacuum Technology & Coating, March, 2023.*
22. Alvaro J. Lizarbe, Juliana (Julie) Boerio-Goates, Matthew R. Linford. “Using Potential Energy Diagrams to Understand why Real Gases become Increasingly Ideal at Higher Temperatures.” *Vacuum Technology & Coating, April, 2023.*
23. Jacob D. Crossman, Joshua W. Pinder, Chandler D. Boss, Matthew R. Linford. “Development and Use of a 3D Printed Alignment Jig for Repositioning Samples in Spectroscopic Ellipsometry.” *Vacuum Technology & Coating, May, 2023.*
24. Pavel Komarov, Radek Dao, Vojtěch Schánilec, Veronika Hegrová, Ondřej Novotny, Michal Pavera, Jan Neuman, Matthew R. Linford. “The AFM-in-SEM technique: True correlative sample analysis with the LiteScope.” *Vacuum Technology & Coating, June, 2023.*
25. Alvaro Lizarbe, David J. Morgan, Matthew R. Linford. “A Brief Discussion of Sample Damage in X-ray Photoelectron Spectroscopy (XPS) with Recommendations for Identifying and Mitigating It.” *Vacuum Technology & Coating, July, 2023.*
26. Samira Jafari, Joshua W. Pinder, Matthew R. Linford. “Preprocessing of X-ray Photoelectron Spectroscopy (XPS) Data for Chemometrics/Machine Learning. Why Autoscaling is Usually a Poor Choice Compared to Mean Centering.” *Vacuum Technology & Coating, August, 2023.*
27. Samira Jafari, Joshua W. Pinder, Alvaro Lizarbe, John M. Linford, Matthew R. Linford “In the Multi-Instrument Characterization of Surfaces and Materials Use Orthogonal Instruments and Data Science Tools. An Analogy to Tiebreakers in Tennis and Soccer.” *Vacuum Technology & Coating, September, 2023.*
28. Jeremy Van Derslice, James Hilfiker, Joshua W. Pinder, Matthew R. Linford “In Situ Spectroscopic Ellipsometry Applications to Atomic Layer Deposition.” J.A. Woollam Annual Newsletter, 2023. (Article originally published in VTC Magazine; Part 2, November 2022.)

29. Joshua W. Pinder, Jacob D. Crossman, Matthew R. Linford “Introducing the Savitzky-Golay (SG) Smooth Using Basic Matrix Algebra, Including Generating SG Kernels. Part 1.” *Vacuum Technology & Coating*, October, 2023.
30. Jacob D. Crossman, Joshua W. Pinder, Matthew R. Linford “Introducing the Savitzky-Golay (SG) Smooth Using Basic Matrix Algebra, Including Generating SG Kernels. Part 2.” *Vacuum Technology & Coating*, November, 2023.
31. James N. Hilfiker, Tom Tiwald, and Matthew R. Linford “Differences Between Standard and Infrared Spectroscopic Ellipsometry (SE).” *Vacuum Technology & Coating*, December, 2023.

PATENTS

32. Anubhav Diwan, Matt Linford U.S. Patent No. 11,822,182 B2. ‘Wire Grid Polarizer with Mult-Layer Silane Conformal Coating’. Nov. 21, 2023.
33. Matthew R. Linford, Brian Johnson, Anubhav Diwan U.S. Patent No. 11,746,418 B2. ‘Chemical Vapor Deposition of Thick Inorganic Coating on a Polarizer’. Sept. 5, 2023.

PEER-REVIEWED CONTRIBUTIONS TO SPECTRAL DATABASES

34. Annika Dean, Samira Jafari, Matthew R. Linford “Analysis of Copper Metal with a K-Alpha Instrument from Thermo Scientific by X-ray Photoelectron Spectroscopy (XPS) at 60 and 200 eV Pass Energy.” *Surface Science Spectra* **2023**, 30, 000000. doi: 10.1116/6.0002958

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35. Patel, Dhananjay; Major, George; Jacobsen, Collin; Shah, Dhruv; Strohmeier, Brian; Shollenberger, Daniel; Bell, David; Argyle, Morris; Linford, Matthew. "Flow Through Atmospheric Pressure – Atomic Layer Deposition (AP-ALD) Reactor for Thin Film Deposition in Capillary Columns." *Anal. Chem.* **2022**, 94, 7483–7491. DOI: 10.1021/acs.analchem.1c05029.
36. George H. Major, Neal Fairley, Peter M.A. Sherwood, Matthew R. Linford, Jeff Terry, Vincent Fernandez, Kateryna Artyushkova. “Erratum: “Practical guide for curve fitting in X-ray photoelectron spectroscopy“ [J. Vac. Sci. Technol. A **38**, 061203 (2020)]” *J. Vac. Sci. Technol. A* **2022**, 40, 057001, doi.org/10.1116/6.0002004.
37. George H. Major, Vincent Fernandez, Neal Fairley, Emily F. Smith, Matthew R. Linford “Guide to XPS Data Analysis: Applying Appropriate Constraints to Synthetic Peaks in XPS Peak Fitting” *J. Vac. Sci. Technol. A* 40, 000000 (2022); doi: 10.1116/6.0001975.
38. Tahereh G. Avval, Neal Gallagher, David Morgan, Pascal Bargiela, Neal Fairley, Vincent Fernandez, Matthew R. Linford. “Practical Guide on Chemometrics/Informatics in X-ray Photoelectron Spectroscopy (XPS), Part 1: Introduction to Methods Useful for Large or Complex Data Sets.” *J. Vac. Sci. Technol. A* **2022**, 40(6). DOI.org/10.1116/6.0002082.

39. Tahereh G. Avval, Hyrum Haack, Neal Gallagher, David Morgan, Pascal Bargiela, Neal Fairley, Vincent Fernandez, Matthew R. Linford. "Practical Guide on Chemometrics/Informatics in X-ray Photoelectron Spectroscopy (XPS), Part 2: Example Applications of Multiple Methods to the Degradation of Cellulose and Tartaric Acid." *J. Vac. Sci. Technol. A* **2022**, *40*(6). DOI: 10.1116/6.0001969.
40. George H. Major, Vincent Fernandez, Neal Fairley, Matthew R. Linford "A Detailed View of the Gaussian-Lorentzian Sum and Product Functions, and their Comparison to the Voigt Function" *Surf. Interface Anal.* **2022**, *54*, 262 – 269, doi:10.1002/sia.7050.

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41. James N. Hilfiker and Matthew R. Linford. "Fitting the Spectroscopic Ellipsometry Data from a Rather Thick (Organic?) Film on Fused Silica. Part 3 – Determining the Optical Constants at all Wavelengths Using a B-spline." *Vacuum Technology & Coating*, January, 2022.
42. George H. Major, Neal Fairley, Vincent Fernandez, Matthew R. Linford "Chemical State Analysis in XPS: A Case Study. Selecting the Right Baseline to Obtain the Correct Cl 2s to Cl 2p Area Ratio from a Sample of NaCl." *Vacuum Technology & Coating*, February, 2022.
43. George H. Major, Neal Fairley, Vincent Fernandez, Matthew R. Linford "How to Measure the Size of the X-ray Beam/Spot in XPS (and in Other Techniques)." *Vacuum Technology & Coating*, March, 2022.
44. Stanislav Průša, Pavel Bábík, Elena Vaníčková, George H. Major, Matthew R. Linford "Practical Considerations for Performing Low Energy Ion Scattering." *Vacuum Technology & Coating*, April, 2022.
45. Joshua Pinder, Mark Engelhard, Don Baer, Paul Dietrich, Andreas Thissen, Matthew R. Linford "Correct and Incorrect Terminology, and Confused Words and Terms, in Surface Analysis." *Vacuum Technology & Coating*, May, 2022.
46. Jonathan Counsell, Adam Roberts, Matthew R. Linford "Automation of Measurements with Modern X-ray Photoelectron Spectrometers." *Vacuum Technology & Coating*, June, 2022.
47. James N. Hilfiker and Matthew R. Linford. "Using Artifact Minimization to Model Thin Metallic Films in Spectroscopic Ellipsometry." *Vacuum Technology & Coating*, July, 2022.
48. James N. Hilfiker and Matthew R. Linford. "Using Interference Enhancement to Increase the Information Content of Spectroscopic Ellipsometry Measurements." *Vacuum Technology & Coating*, August, 2022.
49. James N. Hilfiker and Matthew R. Linford. "Combining Spectroscopic Ellipsometry and Transmission Spectrophotometric Data for the Analysis of Thin Metal Films." *Vacuum Technology & Coating*, September, 2022.
50. James N. Hilfiker, Jeremy Vanderslice, Matthew R. Linford. "In Situ Spectroscopic Ellipsometry, Part 1. Introduction." *Vacuum Technology & Coating*, October, 2022.
51. Jeremy Van Derslice, James N. Hilfiker, Joshua W. Pinder, Matthew R. Linford. "In Situ Spectroscopic Ellipsometry, Part 2. Applications to Atomic Layer Deposition." *Vacuum Technology & Coating*, November, 2022.
52. George H. Major, David Morgan, Matthew R. Linford. "The Sputter Reduction of Metal Oxides. Some Basic Thermodynamic Arguments for why this Takes Place." *Vacuum Technology & Coating*, December, 2022.

EXTENDED ABSTRACT

53. Tahereh G. Avval, George H. Major, Matthew R. Linford “The Reproducibility Crisis, a Comprehensive Set of Guides on XPS, and Better Data Fitting/Chemometrics of XPS Data.” *Microscopy & Microanalysis* 2022. Portland, OR.

PATENTS

54. Stew Nielson, Matt Linford, Anubhav Diwan, Matthew C. George U.S. Patent No. 11,513,272 B2. ‘Wire grid polarizer with silane protective coating’. Nov. 29, 2022.

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55. Thomas R. Gengenbach, George H. Major, Matthew R. Linford, Christopher D Easton ‘Practical Guides for X-ray Photoelectron Spectroscopy (XPS): Interpreting the Carbon 1s Spectrum’ *J. Vac. Sci. Technol. A*, **2021**, 39, 013204.
56. George H. Major, Tahereh G. Avval, Dhananjay I. Patel, Dhruv Shah, Tuhin Roychowdhury, Anders J. Barlow, Paul J. Pigram, Mark Greiner, Vincent Fernandez, Alberto Herrera-Gomez, Matthew R. Linford. A Discussion of Approaches for Fitting Asymmetric Signals in X-ray Photoelectron Spectroscopy (XPS), Noting the Importance of Voigt-like Peak Shapes. Available online at Surface and Interface Analysis. *Surf. Interface Anal.* **2021**, 53, 689–707. <https://doi.org/10.1002/sia.6958>.
57. Patel DI, Roychowdhury T, Shah D, Jacobsen C, Herrington JS, Hoisington J, Myers C, Salazar BG, Walker AV, Bell DS, Linford MR. ‘6-Phenylhexyl silane derivatized, sputtered silicon solid phase microextraction fiber for the parts-per-trillion detection of polyaromatic hydrocarbons in water and baby formula.’ *J. Sep. Science* **2021**, 1 – 13. <https://doi.org/10.1002/jssc.202100266>.
58. Behnam Moeini, Hyrum Haack, Neal Fairley, Vincent Fernandez, Thomas R. Gengenbach, Christopher D Easton, and Matthew R. Linford. ‘Box Plots: A Simple Graphical Tool for Visualizing Overfitting in Peak Fitting as Demonstrated with X-ray Photoelectron Spectroscopy Data.’ *J. Electr. Spect. Rel. Phenom.* **2021**, 250, 147094.
59. Brian I. Johnson, Tahereh G. Avval, R. Steven Turley, Matthew R. Linford, David D. Allred ‘Oxidation of aluminum thin films protected by ultrathin MgF₂ layers measured using spectroscopic ellipsometry and X-ray photoelectron spectroscopy’. *OSA Continuum*, **2021**, 4(3), 879 – 895.
60. Donald R. Baer, Kateryna Artyushkova, Christopher. R. Brundle, James E. Castle, Mark H. Engelhard, Karen J. Gaskell, John. T. Grant, Richard T. Haasch, Matthew R. Linford, Cedric. J. Powell, Peter M. A. Sherwood, Vincent. S. Smentkowski ‘Erratum: “Practical guides for x-ray photoelectron spectroscopy: First steps in planning, conducting, and reporting XPS measurements” [J. Vac. Sci. Technol. A 37, 031401 (2019)]’. *J. Vac. Sci. Technol. A* 39, 000000 (2021); doi: 10.1116/6.0000822.

61. Behnam Moeini, Tahereh G. Avval, Matthew R. Linford, Masoumeh Ghalkhani, Massoud Kaykhahi, Rasol Abdullah Mirzaie. 'Surface-Orientated Platinum Nanoparticles Electrodeposited on Carbon Substrate as a High Performance Electrocatalyst for Glucose Oxidation Reaction in Alkaline Media.' *Materials Science & Engineering B*, **2021**, 268, 115147.
62. Massoud Kaykhahi and Matthew R. Linford 'Characterization of polymeric materials and their degradation products' *Intl. Journal of New Chemistry*, **2021**, 8(1), 1 – 15. DOI: 10.22034/IJNC.2020.139035.1135.
63. Behnam Moeini, Tahereh G. Avval, Masoumeh Ghalkhani Matthew R. Linford, Rasol Abdullah Mirzaie. 'A Nickel Sublayer: An Improvement in the Electrochemical Performance of Platinum-Based Electrocatalysts as Anode in Glucose Alkaline Fuel Cells'. *Iranian Journal of Catalysis*, **2021**, 11(1), 77 – 87.
64. Avval, Tahereh; Moeini, Behnam; Carver, Victoria; Fairley, Neal; Smith, Emily; Baltrusaitis, Jonas; Fernandez, Vincent; Tyler, Bonnie; Gallagher, Neal; Linford, Matthew 'The Often-Overlooked Power of Summary Statistics in Exploratory Data Analysis. Comparison of Pattern Recognition Entropy (PRE) to other Summary Statistics and Introduction of Divided-Spectrum-PRE (DS-PRE).' *J. Chem. Inf. Model.* **2021**, 61, 4173–4189. 10.1021/acs.jcim.1c00244.
65. Moeini, B; Linford, M.R.; Fairley, N.; Barlow, A.; Cumpson, P.; Morgan, D.; Fernandez, V.; Baltrusaitis, J. "Definition of a New (Doniach-Sunjic-Shirley) Peak Shape for Fitting Asymmetric Signals Applied to Reduced Graphene Oxide/Graphene Oxide XPS Spectra" Surface and Interface Analysis. *Surf Interface Anal.* **2022**, 54, 67–77. <http://dx.doi.org/10.1002/sia.7021>.
66. Akin, B.; Linford, M.R.; Ahmadivand, A.; Altindal, S. 'All-dielectric Fabry-Perot Cavity Design for Spectrally Selective Mid-Infrared Absorption' *Phys. Status Solidi B* **2021**, 2100464. <https://doi.org/10.1002/pssb.202100464>.
67. Dhananjay I. Patel, Tuhin Roychowdhury, Collin Jacobsen, Colton Myers, Jason S. Herrington and Matthew R. Linford "Evaluation of New, Sputtered Carbon SPME Fibers with a Multi-Functional Group Test Mixture" *Separations* **2021**, 8, 228. <https://doi.org/10.3390/separations8120228>.

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68. George H. Major, Tahereh G. Avval, Behnam Moeini, William Skinner, Thomas R. Gengenbach, Christopher D. Easton, Alberto Herrera-Gomez, Tim S. Nunnery, Donald R. Baer, Matthew R. Linford. Towards Better Surface and Material Characterization – Understanding the Frequency and Nature of Errors in XPS Data Analysis in the Scientific Literature. *Vacuum Technology & Coating, January, 2021*.
69. George Major, Vincent Fernandez, Neal Fairley, Matthew R. Linford. How Convolution and the Fourier Transform Affect Data Acquisition and Analysis in Material Characterization, and Why XPS Peak Fitting Should Not Be Called 'Deconvolution' *Vacuum Technology & Coating, February, 2021*.
70. Dhruv Shah, Dhananjay I. Patel, Tuhin Roychowdhury, Brian I. Johnson, Matthew R. Linford 'A Case Study in Surface and Material Characterization: Substrate Protection and Deprotection with Evaporated Salt Films to Prevent Surface Contamination, Enable Selective Atomic Layer Deposition, and Protect Biosensors' *Vacuum Technology & Coating, March, 2021*.

71. George H. Major, Neal Fairley, Vincent Fernandez, Matthew R. Linford ‘An Algorithm for Determining the Full Width at Half Maximum (FWHM) Value of a Synthetic Peak/Function’ *Vacuum Technology & Coating*, May, 2021.
72. George H. Major, Emily Smith, Neal Fairley, Matthew R. Linford ‘X-ray Photoelectron Spectroscopy of Germanium with a Native Oxide Layer (Ge/GeO₂): Multiple Chemical States, Spin-Orbit Peaks, Attenuation Lengths, and Overlapping Peaks’ *Vacuum Technology & Coating*, June, 2021.
73. Dhananjay I. Patel, James N. Hilfiker, Matthew R. Linford ‘Using Spectroscopic Ellipsometry to Quickly Determine Whether a Substrate is Coated or Bare’ *Vacuum Technology & Coating*, July, 2021.
74. Dhananjay I. Patel, James N. Hilfiker, Matthew R. Linford ‘Fitting the Spectroscopic Ellipsometry Psi-Delta Data from a ca. 25 nm Film of SiO₂ on Si’ *Vacuum Technology & Coating*, August, 2021.
75. Nick Keller, Andy Antonelli, Matthew R. Linford ‘Optical Critical Dimension Metrology for Semiconductor Manufacturing’ *Vacuum Technology & Coating*, September, 2021.
76. George H. Major and Matthew R. Linford ‘Sixteen Questions (and Answers) about X-ray Photoelectron Spectroscopy and Related Topics’ *Vacuum Technology & Coating*, October, 2021.
77. Dhananjay I. Patel, Collin Jacobsen, James N. Hilfiker, Matthew R. Linford ‘Fitting the Spectroscopic Ellipsometry Data from a Rather Thick (Organic?) Film on Fused Silica. Part 1. Using the ‘Global Fit’.’ *Vacuum Technology & Coating*, November, 2021.
78. James N. Hilfiker, Matthew R. Linford ‘Fitting the Spectroscopic Ellipsometry Data from a Rather Thick (Organic?) Film on Fused Silica. Part 2. Challenges from Bandwidth, Thickness Non-Uniformity, Absorption, and Roughness.’ *Vacuum Technology & Coating*, December, 2021.

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79. Tahereh G. Avval, Sean C. Chapman, Victoria Carver, Paul Dietrich, Andreas Thißen, Matthew R. Linford. ‘Cuttlefish Bone (Cuttlebone), by Near-Ambient Pressure XPS’. *Surface Science Spectra* **2021**, 28, 014002. DOI: 10.1116/6.0000811.
80. Tahereh G. Avval, Stanislav Průša, Sean C. Chapman, Matthew R. Linford, Tomáš Šikola, Hidde H. Brongersma. ‘Zinc and copper, by high-sensitivity - low energy ion scattering. *Surface Science Spectra* **2021**, 28, 014201. DOI: 10.1116/6.0000953.

PATENTS

81. Linford; Matthew R., Diwan; Anubhav, Singh; Bhupinder U.S. ‘Solid phase coatings for microextraction’ Patent No. 10,969,307. April 6, 2021.

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82. Matthew R. Linford, Vincent S. Smentkowski, John T. Grant, C. Richard Brundle, Peter M.A. Sherwood, Mark C. Biesinger, Jeff Terry, Kateryna Artyushkova, Alberto Herrera-Gómez, Sven Tougaard, William Skinner, Jean-Jacques Pireaux, Christopher F. McConville, Christopher D. Easton, Thomas R. Gengenbach, George H. Major, Paul Dietrich, Andreas Thissen, Mark Engelhard, Cedric J. Powell, Karen J. Gaskell and Donald R. Baer. "Proliferation of Faulty Materials Data Analysis in the Literature." *Microscopy and Microanalysis* **2020**, 26(1), 1–2, doi:10.1017/S1431927619015332.
83. George H. Major, Shiladitya Chatterjee, Matthew R. Linford. "Resolving a Mathematical Inconsistency in the Ho and McKay Adsorption Equation." *Applied Surface Science* **2020**, 504, 144157.
84. Brian I. Johnson, Tahereh G. Avval, Joshua John Wheeler, Hans C. Anderson, Anubhav Diwan, Kara J. Stowers, Daniel H. Ess, Matthew R. Linford. "Semiempirical Peak Fitting Guided by ab Initio Calculations of X-ray Photoelectron Spectroscopy Narrow Scans of Chemisorbed, Fluorinated Silanes." *Langmuir* **2020**, 36(8), 1878 – 1886. DOI: 10.1021/acs.langmuir.9b03136.
85. Tuhin Roychowdhury, Dhruv Shah, Varun Jain, Dhananjay I. Patel, Berg Dodson, William Skinner, James N. Hilfiker, Stacey J. Smith, Matthew R. Linford. "Multi-instrument characterization of HiPIMS and DC magnetron sputtered tungsten and copper films." *Surface and Interface Analysis*. <https://doi.org/10.1002/sia.6753>.
86. Leo Lebanov, Shiladitya Chatterjee, Laura Tedone, Sean C. Chapman, Matthew R. Linford, Brett Paull. "Comprehensive characterisation of ylang-ylang essential oils according to distillation time, origin, and chemical composition using a multivariate approach applied to average mass spectra and segmented average mass spectral data." *Accepted Journal of Chromatography A*.
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