

Jason O. Clevenger, Ph.D.
Principal Scientist**Professional Profile**

Dr. Jason O. Clevenger is a Principal Scientist in Exponent's Mechanicals and Materials practice. Dr. Clevenger's expertise includes materials characterization and analysis, physical chemistry, thin film technologies, advanced materials, laser technology, and MEMS. His characterization experience encompasses a broad range of advanced technologies including laser spectroscopy, X-ray photoelectron spectroscopy (XPS), Auger spectroscopy, Raman, FTIR, solid/liquid-NMR, optical emission/absorption spectroscopy, energy dispersive spectroscopy (EDS), white-light interferometry, spectroscopic ellipsometry, atomic force microscopy (AFM), and secondary ion mass spectrometry (SIMS).

He has extensive experience with plasma chemistry and spectroscopy, thin film metrology and reliability, high vacuum technology, laser, optical, microwave systems, and semiconductor process engineering.

Dr. Clevenger's physical chemistry experience is applicable to problems involving materials such as semiconductors, MEMS, metal films, dielectrics, polymers, materials processing, materials characterization, medical devices, pharmaceutical process chemistry, and engineering, identification of trace contaminants including organics and particulates, and corrosion processes.

His pharmaceutical experience includes process engineering and optimization for transdermal and solid oral formulations, regulatory compliance and CMC (Chemistry, Manufacturing, and Controls) related issues, quality assurance, and Quality by Design initiatives. His medical device experience includes method development for regulatory submissions, product development and manufacturing support, and technology due diligence assessment.

Academic Credentials and Professional Honors

Ph.D., Physical Chemistry, Massachusetts Institute of Technology, 2002

B.A., Chemistry, Vanderbilt University (*magna cum laude* with *high honors*), 1995

Phi Beta Kappa and Omicron Delta Kappa

High Honors in Chemistry for Undergraduate Thesis, 1995; Outstanding Senior in Chemistry Award, 1995; T.W. Martin Award and D.E. Pearson Award for Excellence in Undergraduate Research and Study of Physical Chemistry, 1995; J.M. Breckenridge Scholarship, 1994; Barry M. Goldwater Foundation Scholarship, Goldwater Excellence in Education Foundation, 1994; Stephen H. Cook Summer Research Fellowship, 1994; Top-Tennessee Scholars Tuition Scholarship, 1993; Eastman Kodak National Merit Scholarship, 1991

Patents

Published Application No. 2006/0102597: Electron Beam Welding Method and Apparatus Using Controlled Volumetric Heating, May 2006 (with S. Brown and P. Mendez).

Publications

Clevenger JO, Ralston B. Rapid development. *Med Device Develop* 2009; Oct.

Steffey D, Ostarello A, Clevenger J, Villarraga, M. Troubleshooting analyses of production data. *Int J Ind Eng* 2009; 16(3):206–213.

Clevenger JO. Sticky situations: Hydrophilic coatings. *Med Device Develop* 2008; Dec.

Poliskie M, Clevenger JO. FTIR spectroscopy for characterization and failure analysis. *Met Finish* 2008; 5:44.

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Ibarreta A, Davis S, Clevenger JO. Flammability of electrical crimp connectors subjected to heating. *Proceedings, Fire and Materials 10th International Conference*, 2007.

Kay JJ, Byun DS, Clevenger JO, Jiang X, Petrovic VS, Seiler R, Barchi JR, Merer AJ, Field RW. “Spectrum-only” assignment of core-penetrating and core-nonpenetrating Rydberg states of calcium monofluoride. *Can J Chem* 2004; 82(6):791–803.

Brooks CB, Anderson RB, Clevenger JO, Collard C, Halim M, Sahin T, Mak, AW. Optimization of chrome dry etch in Tetra II using asymmetrically loaded patterns. *Proceedings, SPIE-The International Society for Optical Engineering*, 2003, 5256 (Pt. 2, 23rd Annual BACUS Symposium on Photomask Technology, 2003), pp. 749–757.

Collard C, Anderson SA, Anderson RB, Clevenger JO, Halim M, Brooks CB, Buie MJ, Sahin T. Examination of various endpoint methods for chrome mask etch. *Proceedings, SPIE-The International Society for Optical Engineering*, 2003) 5256 (Pt. 2, 23rd Annual BACUS Symposium on Photomask Technology, 2003), pp. 744–748.

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Anderson SA, Anderson RB, Buie MJ, Chandrachud M, Clevenger JO, Lee Y, Sandlin NL; Ding J. Optimization of a 65-nm alternating phase-shift quartz etch process. *Proceedings, SPIE-The International Society for Optical Engineering*, 2003, 5256 (Pt. 1, 23rd Annual BACUS Symposium on Photomask Technology, 2003), pp. 66–75.

Clevenger JO, Buie MJ, Sandlin NL. Effect of chamber seasoning on the chrome dry etch process. Proceedings, SPIE-The International Society for Optical Engineering, 2003, 5130 (Photomask and Next-Generation Lithography Mask Technology X), pp. 92–100.

Li L, Dai X, Liu Y, Clevenger JO, Field RW, Jeung GH, Geum N, Lyyra AM. The Predissociation of the $1^3\Sigma_g^-$ State of $^7\text{Li}_2$. J Molecul Spectrosc 2001; 205(1):139–145.

Dai X, Clevenger JO, Liu Y, Song M, Shang J, Chen D, Field RW; Li L. The $2^3\Delta_g$ State of $^7\text{Li}_2$. J Molecul Spectrosc 2000; 200(1):120–122.

Clevenger JO, Harris NA, Field RW, Li J. The predissociation mechanism for $^2\Sigma^+$ Rydberg states of CaCl. J Molecul Spectrosc 1999; 193(2):412–417.

Clevenger JO, Tellinghuisen, J. The $B(1/2^2P_{3/2}) - X(1/2^2\Sigma^+)$ transition in XeBr. J Chem Phys 1995; 103(22):9611–9620.

Clevenger JO, Tellinghuisen J. High-resolution spectroscopy with a CCD array detector. The $B - X$ transition in $^{136}\text{Xe}^{81}\text{Br}$. Chem Phys Lett 1994; 231(4,5,6):515–520.

Clevenger JO, Ray QP, Tellinghuisen J, Zheng X, Heaven MC. Spectroscopy of metastable species in a free-jet expansion: The $\beta - A$ transition in IBr. Can J Phys 1994; 72(11&12):1294–1306.

Radzykewycz DT, Littlejohn CD, Carter MB, Clevenger JO, Purvis JH, Tellinghuisen J. The $D' - A'$ transition in IBr: A deperturbation analysis. J Molecul Spectrosc 1994; 166(2):287–303.

Prior Experience

Process Technologist (Etch and CVD), Applied Materials, Inc., 2002–2004

Professional Affiliations

- American Association of Pharmaceutical Scientists—AAPS
- American Chemical Society—ACS
- Optical Society of America—OSA
- Society of Photo-Optical Instrumentation Engineers—SPIE