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Engineering & Scientific Consulting

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Professional Profile

Dr. Clevenger's expertise focuses on materials characterization and process development for specialty manufacturing, with a particular emphasis on regulated products such as medical devices and pharmaceuticals. Dr. Clevenger's physical chemistry experience is applicable to problems involving materials such as semiconductors, MEMS, metal films, dielectrics, polymers, materials processing, materials characterization, pharmaceutical process chemistry, identification of trace contaminants including organics and particulates, and corrosion processes.

His pharmaceutical experience includes process development and optimization for transdermal and solid oral formulations, regulatory compliance and CMC (Chemistry, Manufacturing, and Controls) related issues involving root cause analysis, corrective and preventive action plans and quality assurance. His medical device experience includes method development for regulatory submissions, product development and manufacturing support, and technology due diligence assessment. He has been intimately involved in the development of combination drug/device products as well as litigation matters involving patent infringement, contract manufacturing and business disputes for regulated products.

Dr. Clevenger's characterization background encompasses a broad range of advanced technologies and techniques including laser spectroscopy, X-ray photoelectron spectroscopy (XPS), Auger spectroscopy, Raman, FTIR, solid/liquid-NMR, gas and liquid chromatography (GC/LC) with mass spectrometry (MS), optical emission/absorption spectroscopy, energy dispersive spectroscopy (EDS), white-light interferometry, spectroscopic ellipsometry, atomic force microscopy (AFM), and secondary ion mass spectrometry (SIMS). In addition, he has extensive experience with plasma chemistry and spectroscopy, thin film metrology and reliability, high vacuum technology, and semiconductor processing.

Academic Credentials & Professional Honors

Ph.D., Physical Chemistry, Massachusetts Institute of Technology (MIT), 2002

B.A., Chemistry, Vanderbilt University, 1995

Phi Beta Kappa and Omicron Delta Kappa

Barry M. Goldwater Foundation Scholarship, Goldwater Excellence in Education Foundation, (1994)

Prior Experience

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

Professional Affiliations

American Association of Pharmaceutical Scientists—AAPS

American Chemical Society—ACS

Patents

United States Patent – US 9,744,353 B2. Detection of Presence and Alignment of a Therapeutic Agent in an Iontophoretic Drug Delivery Device, Issued August 29, 2017 (with R. Mann and D. Saar)

Publications

Coombs, C. Rodriguez-Quijada, J.O. Clevenger, A.F. Sauer-Budge. 2023. Current Understanding of Potential Linkages between Biocide Tolerance and Antibiotic Cross-Resistance. *Microorganisms* 11(8): 2000.

Kou PM, Clevenger JO. A coat for all weathers: A survey of the hydrophilic coatings market. *Med Device Develop* 2012; May.

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.

Goldsmith C, Forehand D, Scarborough S, Peng Z, Palego C, Hwang J, Clevenger J. Understanding and improving longevity in RF MEMS capacitive switches. Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS VII, Proc. of SPIE Vol. 6884, 2008.

Clevenger JO. Safe surface—Anti-microbial coatings for implants. *Med Device Develop*, 2007.

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.

Hammond E, Clevenger JO, Buie MJ. Plasma and flow modeling of photomask etch chambers. Proceedings, SPIE-The International Society for Optical Engineering, 5256 (Pt. 2, 23rd Annual BACUS Symposium on Photomask Technology, 2003), pp. 713-723.

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 1^3S_g State of 7Li_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 2^3D_g State of 7Li_2 . J Molecul Spectrosc 2000; 200(1):120-122.

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

Clevenger JO, Tellinghuisen, J. The $B(1/2 \ ^2P_{3/2}) - X(1/2 \ ^2S^+)$ 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 $^{136}Xe^{81}Br$. 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 $b - A$ 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 $D^1 - A^1$ transition in IBr: A deperturbation analysis. J Molecul Spectrosc 1994; 166(2):287-303.