

MARC CHRISTOPHERSEN, PhD
U.S. Patent Agent, Reg. Number 64,665

Address:	<i>Business:</i> U.S. Naval Research Laboratory 4555 Overlook Ave., S.W. Washington, DC 20375-5320	<i>Home:</i> 2351 Eisenhower Ave., Apt.#406 Alexandria, VA 22314
Tel. office:	(202)-404-2884	Cell: (571)-332-3482
Email:	marcchristo@gmail.com	

EDUCATION

Department of Materials Science, University of Kiel, Kiel, Germany.

Ph.D. (Dr.-Ing.), *June 2002* *summa cum laude*

M.S. (Dipl.-Ing.), *November 1998* **GPA:4.00**

Vordiplom (undergraduate in material science), *June 1995* **GPA:3.29**

PhD Advisor: Professor H. Föll

Area of specialization: electrochemistry of semiconductors and MEMS structuring.

Virginia Polytechnic Institute and State University, West Falls, VA.

PMP (certified Project Management Professional), *July 2008*

Suffolk University, Boston, MA.

Patent Bar Review Course with the PLI (Practicing Law Institute), *June 2008*

BAR ADMISSION: U.S. Patent and Trademark Office, Reg. Number 64,665, *June 2009*

POSTDOCTORAL RESEARCH EXPERIENCE

National Research Council Postdoctoral Fellowship (overall A+ rating), Jan. 2007 - present

Naval Research Laboratory, High Energy Space Environment, Washington DC

Research Advisor: Dr. B. Philips

Area of specialization: Development of gamma-ray and neutron detectors, MEMS fabrication, gray-tone lithography.

Department of Mechanical Engineering, University of Maryland, Nov. 2004 – Jan. 2007

Research Advisor: Professor E. Smela

Area of specialization: Development of a cell based sensor, polypyrrole based micro-actuators, MEMS structuring directly on CMOS chips, optical filtering on CMOS chips.

Center for Future Health, University of Rochester, July 2002 – Sept. 2003

Research Advisor: Professor P. M. Fauchet

Area of specialization: Development of bio-sensors DNA and pathogen liquids, fabrication of photonic band gap materials.

WORK EXPERIENCE

Senior Scientist R&D, Lake Shore Cryotronics, Inc., Sept. 2003 – Oct. 2004

Area of specialization: MEMS and semiconductor fabrication, development of optical infra-red and UV filters for space and defense applications.

PI for NASA SBIR I award (*Proposal Number: 04 E1.01-8745*), \$100,000, 2004

PERSONAL INFORMATION

U.S. citizen, married.

Interests: Traveling, literature; Sports: fitness, canoeing, hiking, skiing.

Languages: fluent in English and German.

MEMBERSHIPS

- *German Physical Society*, DPG
- *Materials Research Society*, MRS
- *Electrochemical Society*, ECS
- *American Chemical Society*, ACS (member of the *Chemistry & the Law* division)

PATENTS

- [1] **M. Christophersen**, J. Bahr, J. Carstensen, K. Steen, and H. Foell, "Device for etching semiconductors with a large surface area," *European, French, German patent, US patent*, AU002003264239A1, US020050199511A1, 2003.
- [2] H. Föll, J. Carstensen, and **M. Christophersen**, "Fabrication of porous membranes," *European, French, German patent*, DE000010318995A1, 2003.
- [3] V. Kochergin and **M. Christophersen**, "Active feedback method during semiconductor anodization," *US patent pending*, US020050199511A1, 2005.
- [4] **M. Christophersen**, Vladimir Kochergin, and Philip R. Swinehart, "Mesoporous silicon infrared filters and methods of making same," *US patent pending*, US 2006/0027459 A1., 2005.
- [5] Huimin Ouyang, Philippe M. Fauchet, and **M. Christophersen**, "Macroporous silicon microcavity with tunable pore size," *US patent pending*, US 2006/0276047 A1, 2006.
- [6] H. Foell, J. Carstensen, and **M. Christophersen**, "Verfahren zur Herstellung von Membranen mit durchgängigen Poren", *German patent*, DE000010362083B4, 2007.
- [7] **M. Christophersen** and B. F. Philips, "Methods and Systems of Curved Radiation Detector Fabrication", *US patent pending*, US 61106417, 2008.
- [8] **M. Christophersen** and B. F. Philips "Methods and Systems of Thick Silicon Drift Detector Fabrication", *US patent pending*, US 61106460, 2008.
- [9] **M. Christophersen** and B. F. Philips, "Gray-tone lithography using optical diffusers", *US patent pending*, US 12/195,594, 2008.

JOURNAL PUBLICATIONS

h-index=17, Sum of the Times Cited: 950 www.ResearcherID.com (ID #B-6795-2008)

- [1] **M. Christophersen**, B. F. Philips, and F. Kub "Trenched Gamma-Ray Detector", submitted to *IEEE Transactions on Nuclear Science*, 2008.
- [2] B.F. Philips and **M. Christophersen**, "Curved Radiation Detector", submitted to *IEEE Transactions on Nuclear Science*, 2008.
- [3] **M. Christophersen**, and B. F. Philips, "Gray-tone lithography using an optical diffuser and contact aligner lithography", *Applied Physics Letters*, vol. 92, pp. 194102, 2008.
- [4] S. Bangalore Prakash, M. Urdaneta, **M. Christophersen**, E. Smela, P. Abshire, "In situ electrochemical control of electroactive polymer films on a CMOS chip" *Sensors and Actuators B*, vol. 129 (2), pp. 699-704, 2008.
- [5] **M. Christophersen**, B. Shapiro, and E. Smela, "Characterization and modeling of PPy bilayer microactuators" *Sensors and Actuators B*, vol. 115, pp. 596-609, 2006.
- [6] N. Chaaben, J. Yahyaoui, **M. Christophersen**, T. Boufaden, B. El Jani, "Morphological properties of AlN and GaN grown by MOVPE on porous Si(111) and Si(111) substrates, *Superlattices and Microstructures*, vol. 40, pp. 483-489, 2006.
- [7] J. Carstensen, **M. Christophersen**, S. Lölkes, E. Ossei-Wusu, J. Bahr, S. Langa, G. Popkirov, H. Föll, "Large area etching for porous semiconductors", *Physica Status Solidi C*, vol. 2, pp. 3339-3343, 2005.
- [8] J. Zheng, **M. Christophersen**, and P. Bergstrom, "Formation technique for macroporous morphology superlattice," *Physica Status Solidi A*, vol. 202, pp. 1662-1667, 2005.

- [9] J. Zheng, **M. Christophersen**, and P. Bergstrom, "Thick macroporous membranes made of p-type silicon," *Physica Status Solidi A*, vol. 202, pp. 1402-1406, 2005.
- [10] H. Ouyang, **M. Christophersen**, and P. M. Fauchet, "Enhanced control of porous silicon morphology from macropore to mesopore formation," *Physica Status Solidi A*, vol. 202, pp. 1396-1401, 2005.
- [11] H. Ouyang, **M. Christophersen**, and P. M. Fauchet, "Macroporous silicon microcavities for macromolecule detection," *Advanced Functional Materials*, vol. 15, pp. 1851-1859, 2005.
- [12] S. Langa, J. Carstensen, **M. Christophersen**, K. Steen, S. Loelkes, I. M. Tiginyanu, and H. Föll, "Uniform and non-uniform nucleation of pores during the anodization of Si, Ge, and III-V Semiconductors," *Journal of the Electrochemical Society*, vol. 152, pp. C525, 2005.
- [13] V. Kochergin, **M. Christophersen**, and H. Föll, "Surface plasmon enhancement of an optical anisotropy in porous silicon/metal composite," *Applied Physics B*, vol. 80, pp. 81-87, 2005.
- [14] V. Kochergin, **M. Christophersen**, and H. Föll, "Adjustable optical anisotropy in porous GaAs," *Applied Physics Letters*, vol. 86, 2005.
- [15] M. Archer, **M. Christophersen**, and P. M. Fauchet, "Electrical porous silicon chemical sensor for detection of organic solvents," *Sensors and Actuators B*, vol. 106, pp. 347-357, 2005.
- [16] V. Kochergin, **M. Christophersen**, and H. Föll, "Effective medium approach for calculations of optical anisotropy in porous materials," *Applied Physics B*, vol. 79, pp. 731-739, 2004.
- [17] N. Chaaben, T. Boufaden, **M. Christophersen**, and B. El Jani, "Structural and optical characterization of GaN grown on porous silicon substrate by MOVPE," *Microelectronics Journal*, vol. 35, pp. 891-895, 2004.
- [18] M. Archer, **M. Christophersen**, and P. M. Fauchet, "Macroporous silicon electrical sensor for DNA hybridization detection," *Biomedical Microdevices*, vol. 6, pp. 203-211, 2004.
- [19] S. Lolkes, **M. Christophersen**, S. Langa, J. Carstensen, and H. Föll, "Selforganized formation of crystallographically oriented octahedral cavities during electrochemical pore etching," *Materials Science and Engineering B*, vol. 101, pp. 159-163, 2003.
- [20] S. Langa, I. M. Tiginyanu, J. Carstensen, **M. Christophersen**, and H. Föll, "Self-organized growth of single crystals of nanopores," *Applied Physics Letters*, vol. 82, pp. 278-280, 2003.
- [21] S. Langa, **M. Christophersen**, J. Carstensen, I. M. Tiginyanu, and H. Föll, "Electrochemical pore etching in Ge," *Physica Status Solidi A*, vol. 195, pp. R4-R6, 2003.
- [22] S. Langa, J. Carstensen, **M. Christophersen**, I. M. Tiginyanu, and H. Föll, "Voltage oscillations - an emergent property at high density pore growth," *Physica Status Solidi A*, vol. 197, pp. 186-191, 2003.
- [23] S. Langa, **M. Christophersen**, J. Carstensen, I. M. Tiginyanu, and H. Föll, "Single crystalline 2D porous arrays obtained by self organization in n-InP," *Physica Status Solidi A*, vol. 197, pp. 77-82, 2003.
- [24] H. Föll, S. Langa, J. Carstensen, **M. Christophersen**, and I. M. Tiginyanu, "Pores in III-V semiconductors," *Advanced Materials*, vol. 15, pp. 183, 2003.
- [25] H. Föll, J. Carstensen, S. Langa, **M. Christophersen**, and I. M. Tiginyanu, "Porous III-V compound semiconductors: formation, properties, and comparison to silicon," *Physica Status Solidi A*, vol. 197, pp. 61-70, 2003.

- [26] J. C. Claussen, J. Carstensen, **M. Christophersen**, S. Langa, and H. Föll, "Self-organized pore formation and open-loop control in semiconductor etching," *Chaos*, vol. 13, pp. 217-224, 2003.
- [27] **M. Christophersen**, S. Langa, J. Carstensen, I. M. Tiginyanu, and H. Föll, "A comparison of pores in silicon and pores in III-V compound materials," *Physica Status Solidi A*, vol. 197, pp. 197-203, 2003.
- [28] **M. Christophersen**, J. Carstensen, K. Voigt, and H. Föll, "Organic and aqueous electrolytes used for etching macro- and mesoporous silicon," *Physica Status Solidi A*, vol. 197, pp. 34-38, 2003.
- [29] T. Boufaden, N. Chaaben, **M. Christophersen**, and B. El Jani, "GaN growth on porous silicon by MOVPE," *Microelectronics Journal*, vol. 34, pp. 843-848, 2003. *Citations: 2*.
- [30] S. Langa, J. Carstensen, I. M. Tiginyanu, **M. Christophersen**, and H. Föll, "Formation of tetrahedron-like pores during anodic etching of (100) oriented n-GaAs," *Electrochemical and Solid State Letters*, vol. 5, pp. C14-C17, 2002.
- [31] H. Föll, **M. Christophersen**, J. Carstensen, and G. Hasse, "Formation and application of porous silicon," *Materials Science & Engineering R*, vol. 39, pp. 93-141, 2002.
- [32] S. Langa, J. Carstensen, **M. Christophersen**, H. Föll, and I. M. Tiginyanu, "Observation of crossing pores in anodically etched n-GaAs," *Applied Physics Letters*, vol. 78, pp. 1074-1076, 2001.
- [33] S. Langa, J. Carstensen, I. M. Tiginyanu, **M. Christophersen**, and H. Föll, "Self-induced voltage oscillations during anodic etching of n-InP and possible applications for three-dimensional microstructures," *Electrochemical and Solid State Letters*, vol. 4, pp. G50-G52, 2001.
- [34] **M. Christophersen**, P. Merz, J. Quenzer, J. Carstensen, and H. Föll, "Deep electrochemical trench etching with organic hydrofluoric electrolytes," *Sensors and Actuators A*, vol. 88, pp. 241-246, 2001.
- [35] **M. Christophersen**, J. Carstensen, S. Ronnebeck, C. Jager, W. Jager, and H. Föll, "Crystal orientation dependence and anisotropic properties of macropore formation of p- and n-type silicon," *Journal of the Electrochemical Society*, vol. 148, pp. E267-E275, 2001.
- [36] S. Langa, I. M. Tiginyanu, J. Carstensen, **M. Christophersen**, and H. Föll, "Formation of porous layers with different morphologies during anodic etching of n-InP," *Electrochemical and Solid State Letters*, vol. 3, pp. 514-516, 2000.
- [37] C. Jager, B. Finkenberger, W. Jager, **M. Christophersen**, J. Carstensen, and H. Föll, "Transmission electron microscopy investigations of the formation of macropores in n- and p-Si(001)/(111)," *Materials Science and Engineering B*, vol. 69, pp. 199-204, 2000.
- [38] G. Hasse, **M. Christophersen**, J. Carstensen, and H. Föll, "New insights into Si electrochemistry and pore growth by transient measurements and impedance spectroscopy," *Physica Status Solidi A*, vol. 182, pp. 23-29, 2000.
- [39] H. Föll, J. Carstensen, **M. Christophersen**, and G. Hasse, "A new view of silicon electrochemistry," *Physica Status Solidi A*, vol. 182, pp. 7-16, 2000.
- [40] **M. Christophersen**, J. Carstensen, A. Feuerhake, and H. Föll, "Crystal orientation and electrolyte dependence for macropore nucleation and stable growth on p-type Si," *Materials Science and Engineering B*, vol. 69, pp. 194-198, 2000.
- [41] **M. Christophersen**, P. Merz, J. Quenzer, J. Carstensen, and H. Föll, "A new way to silicon microstructuring with electrochemical etching," *Physica Status Solidi A*, vol. 182, pp. 561-566, 2000.

- [42] **M. Christophersen**, J. Carstensen, and H. Föll, "Crystal orientation dependence of macropore formation in p-type silicon using organic electrolytes," *Physica Status Solidi A*, vol. 182, pp. 103-107, 2000.
- [43] **M. Christophersen**, J. Carstensen, and H. Föll, "Macropore formation on highly doped n-type silicon," *Physica Status Solidi A*, vol. 182, pp. 45-50, 2000.
- [44] **M. Christophersen**, J. Carstensen, and H. Föll, "Crystal orientation dependence of macropore formation in n-type silicon using organic electrolytes," *Physica Status Solidi A*, vol. 182, pp. 601-606, 2000.
- [45] J. Carstensen, **M. Christophersen**, and H. Föll, "Pore formation mechanisms for the Si-HF system," *Materials Science and Engineering B*, vol. 69, pp. 23-28, 2000.
- [46] J. Carstensen, **M. Christophersen**, G. Hasse, and H. Föll, "Parameter dependence of pore formation in silicon within a model of local current bursts," *Physica Status Solidi A*, vol. 182, pp. 63-69, 2000.
- [47] M. H. Al Rifai, **M. Christophersen**, S. Ottow, J. Carstensen, and H. Föll, "Dependence of macropore formation in n-Si on potential, temperature, and doping," *Journal of the Electrochemical Society*, vol. 147, pp. 627-635, 2000.
- [48] M. H. Al Rifai, **M. Christophersen**, S. Ottow, J. Carstensen, and H. Föll, "Potential, temperature and doping dependence for macropore formation on n-Si with backside-illumination," *Journal of Porous Materials*, vol. 7, pp. 33-36, 2000.

REFEREED PROCEEDINGS

- [1] **M. Christophersen** and B.F. Philips, "Thick Silicon Drift Detectors", *2008 Nuclear Science Symposium and Medical Imaging Conference proceedings*, 2008.
- [2] **M. Christophersen**, B.F. Philips, and F. Kub, "Trenched Gamma-Ray Detector", *2008 Nuclear Science Symposium and Medical Imaging Conference proceedings*, 2008.
- [3] B. F. Philips and **M. Christophersen**, "Curved Radiation Detector", *2008 Nuclear Science Symposium and Medical Imaging Conference proceedings*, 2008.
- [4] **M. Christophersen** and E. Smela, "Polypyrrole/gold bilayer microactuators: response time and temperature effects," *SPIE Int. Soc. Opt. Eng.*, vol. 6168, 2006.
- [5] S. Bangalore Prakash, P. Abshire, M. Urdaneta, **M. Christophersen**, E. Smela, "A CMOS potentiostat for control of integrated MEMS actuators", *Circuits and Systems, ISCAS 2006, proceedings*, 2006.
- [6] M. Urdaneta, **M. Christophersen**, E. Smela, S. B. Prakash, N. Nelson, P. Abshire, "Cell Clinics Technology Platform for Cell-Based Sensing", *2006 IEEE/NLM Life Science Systems and Applications Workshop*, pp.1-2, 2006.
- [7] M. Urdaneta, L. Yingkai, **M. Christophersen**, S. Prakash, P. Abshire, and E. Smela, "Integrating conjugated polymer microactuators with CMOS sensing circuitry for studying living cells," *SPIE Int. Soc. Opt. Eng.*, vol. 5759, pp. 232, 2005.
- [8] S. Fanning, Y. Liu, **M. Christophersen**, M. Dürkop, E. Smela, and B. Shapiro, "Polypyrrole/gold bilayer characterization," *SPIE Int. Soc. Opt. Eng.*, vol. 5759, pp. 292, 2005.
- [9] H. Ouyang, L. DeLouise, **M. Christophersen**, B. L. Miller, and P. M. Fauchet, "Biosensing with one-dimensional photonic bandgap structure," *SPIE Int. Soc. Opt. Eng.*, vol. 5511, pp. 71, 2004.
- [10] V. Kochergin, **M. Christophersen**, and P. Swinehart, "Macroporous silicon UV filters for space and terrestrial environments," *SPIE Int. Soc. Opt. Eng.*, vol. 5554, pp. 223, 2004.

- [11] V. Kochergin, **M. Christophersen**, and P. Swinehart, "Macroporous silicon-based polarization components," *SPIE Int. Soc. Opt. Eng.*, vol. 5515, pp. 132, 2004.
- [12] **M. Christophersen**, V. Kochergin, and P. Swinehart, "Porous silicon filters for mid- to far-IR range," *SPIE Int. Soc. Opt. Eng.*, vol. 5524, pp. 158, 2004.
- [13] M. Archer, **M. Christophersen**, P. M. Fauchet, P. Persaud, and K. D. Hirschman, "Electrical porous silicon microarray for DNA hybridization detection," *Material Research Society*, vol. 782, pp. A7.2, 2004.
- [14] J. C. Claussen, C. Carstensen, **M. Christophersen**, S. Langa, and H. Föll, "Open-loop control of pore formation in semiconductor etching," *PHYSICON03 Proceedings*, vol. 3, pp. 895-900, 2003.
- [15] I. M. Tiginyanu, S. Langa, V. V. E. Foca, J. Carstensen, **M. Christophersen**, and H. Föll, "Properties of 2D and 3D dielectric structures fabricated by electrochemical dissolution of III-V compounds," *Material Research Society*, vol. 692, pp. K2.7, 2002.
- [16] H. Föll, J. Carstensen, **M. Christophersen**, and G. Hasse, "Pore etching in compound semiconductors for the production of photonic crystals," *Material Research Society*, vol. 722, pp. L6.4.1, 2002.
- [17] M. A. Stevens Kalceff, S. Langa, I. M. Tiginyanu, J. Carstensen, **M. Christophersen**, and H. Föll, "Comparative SEM and cathodoluminescence microanalysis of porous GaP structures," *Material Research Society*, vol. 638, pp. F5.31, 2000.
- [18] M. Archer, **M. Christophersen**, and P. M. Fauchet, "Porous silicon electrical biosensors," *Material Research Society*, vol. 737, pp. F4.2, 2002.
- [19] H. Föll, J. Carstensen, **M. Christophersen**, and G. Hasse, "A stochastic model for current oscillations in space and time at the silicon electrode," *Proceedings of the Electrochemical Society*, vol. 36, pp. 7-19, 2000.
- [20] C. Jäger, C. Dieker, W. Jäger, **M. Christophersen**, J. Carstensen, and H. Föll, "New insights into the formation of macropores in n-Si(001) and p-Si(001)," *Int. Phys. Conf. Ser.*, vol. 164, pp. 507-512, 1999.

BOOK CHAPTERS

- [1] S. Langa, I. M. Tiginyanu, J. Carstensen, **M. Christophersen**, and H. Föll, "The way to uniformity in porous III-V compounds via self-organization and lithography patterning," *Ordered Porous Nanostructures and Applications (Nanostructure Science and Technology)*, Editor: R. B. Wehrspohn, Plenum Press, New York, 2005.
- [2] J. Claussen, J. Carstensen, **M. Christophersen**, S. Langa, and H. Föll, "Self-organized formation of fractal and regular pores in semiconductors," *Interface and Transport Dynamics*, Editors: H. Emmerich, B. Nestler, M. Schreckenber, Lecture Notes in Computational Science and Engineering, Springer, Berlin, 2003.