Personal Data

Kenneth C. Cadien, P.Eng.
Professor and Interim Chair
Department of Chemical and Materials Engineering, University of Alberta
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Citizenship: Canadian

University Education

PhD	Materials Engineering	University of Illinois
MEng	Metallurgical Engineering	McGill University
BEng (Summa Cum Laude)	Metallurgical Engineering	McGill University

Work Experience

University of Alberta
Department Chemical &Materials Engineering

Professor	2007-present
Interim Chair	2016-2017
Acting Chair	2015-2016
Associate Chair Graduate Studies	2011-2014
CRC Tier 1 Chair in Nanofabrication	2007-2014
Alberta Innovates Technology Futures Scholar	2007-2014

Intel Corporation 1990-2006
Logic Technology Development, Hillsboro, Oregon

Intel Fellow, Director of Innovative Technology	1998-2006
Senior Principal Engineer	1996-1998
Principal Engineer	1994-1996
Senior Process Engineer	1992-1994

California Technology Development, Santa Clara, California

Thin Films Group Leader	1990-1992

Westaim Incorporated, Fort Saskatchewan, Alberta

Principal engineer, Thin films	1988-1990

Eastman Kodak, Rochester, New York
Microelectronics Technology Division, Corporate Research Center

Group leader and senior research associate	1986-1988

Rensselaer Polytechnic Institute, Troy, New York
Department Materials Science & the Center for Integrated Electronics
Assistant professor 1983-1986

Duke University and the Microelectronic Center of North Carolina,
Assistant Professor 1982-1983

Eastman Kodak, Rochester, New York
Corporate Research Center, Physics Division
Research Associate 1981-1982

Honours and Awards

Pre-Doctoral

(h1) McConnell Foundation Scholar (two years) McGill University

(h2) G. Sproule Scholar McGill University

(h3) W.H.Howard Scholar McGill University

(h4) British Association Medal for Great Distinction in Metallurgy McGill University

(h5) McConnell Foundation Fellow (Two years) McGill University

(h6) National Research Council Fellow McGill University

(h7) University of Illinois Fellow (Two years) University of Illinois

Post-Doctoral

(h8) IBM Young Faculty Development Award 1984-86

(h9) Alfred H. Geisler Memorial Award, American Society for Metals 1986

(h10) Kodak Quality Award, Analyzing & Solving a Complex Production Issue 1987

(h11) Intel California Technology Development
Manufacturing Excellence Award for "D2 JIT Implementation" 1991

(h12) Intel Portland Technology Development Recognition Award
"In recognition of your outstanding contribution to the invention and
demonstration of the W-polish chemistry and delivery system" 1992

(h13) Intel Star Award, Portland Technology Development,
"Inventiveness, enthusiasm, and leadership in all aspects of
P854 W CMP Development" 1996

(one of only two of these awards that has ever been given)

(h14) Intel Distinguished Lecturer 1996-1997

(h15) Intel Fellow, Director of Innovative Technology 1998

(h16) Intel Process Technology Conference 2000, Best exhibit session award
"Process Optimization of P860 CMP using Physicochemical Models" 2000

(h17) Intel Quality & Reliability Technical Symposium 2004
Best paper in Session 1 award, "Analytical and Reliability Challenges
for Emerging Si Technologies" 2004

(h18) Intel Teamwork Award for "Development of the world's first high
performance high k/metal gate technology" 2005

(h19) Intel Digital Architecture and Planning Division Recognition Award
"For successfully driving the Ozette fully integrated CMOS voltage regulator
technology and architecture to wide acceptance in the Digital Enterprise Group" 2005

(h20) CRC Tier 1 Chair, Nanofabrication 2007

(h21) IEEE Fellow 2008

(h22) Alberta Innovates Technology Futures Scholar in Nanofabrication 2009

(h23) NINT Fellow 2012

Teaching

Dr. Cadien developed many of the materials engineering courses for the nano program that was implemented circa 2009. This includes MATE 490, 491 and 494, as well as ECE 450 (developed at the request of the Chairs of ECE and CME). He was also the key person responsible for developing the undergraduate nano laboratory on the 6th floor of ECERF, including justifying and purchasing the equipment, and layout of the lab.

Course	Description	Semester	Enrol.	USRI #221
MATE 491/669	Functional Materials	Fall 2015	35	4.0
MATE 491/669	Functional Materials	Fall 2014	38	4.5
MATE 491/669	Functional Materials	Fall 2013	27	4.7
MATE 491	Functional Materials	Fall 2012	38	4.8
MATE 494	Nanostructured Materials	Winter 2012	20	4.5
MATE 491	Functional Materials	Fall 2011	33	4.3
MATE 494	Nanostructured Materials	Winter 2011	20	4.6
MATE 491	Functional Materials	Fall 2010	34	4.5
MATE 494	Nanostructured Materials	Winter 2010	11	4.7
MATE 491	Functional Materials	Fall 2009	23	4.7
CME 481	Colloquium I	Fall 2009	35	4.7
CME 483	Colloquium II	Winter 2009	25	4.8
CME 481	Colloquium I	Fall 2008	28	4.7
CME 200	Intro CHE & MATE	Fall 2008	203	
MATE 491	Functional Materials	Fall 2008	5	4.8
CME 483 (c)	Colloquium II	Winter 2008	31	
MATE 355	Electronic Materials	Winter 2008	15	
MATE 491	Functional Materials	Fall 2007	4	

Research Funding

1) PI, NSERC RTI Application, "Improved Capability for Atomic Layer Deposition System", 2017/5-2018/4, Total Funding applied for $147,500.
2) PI, NSERC Discovery Grant Application, "Atomic Layer Deposition of Complex Oxides for Novel Devices", 2017/5-2022/4. Total Funding applied for $300,000.
3) Principal Applicant for Leaders Opportunity Fund (LOF) for a CFI from Engineering and Science at the University of Alberta "Energy Materials Characterization and Control (EMC2)", 2013/4 - 2017/3, Funding Agencies: Canada Foundation for Innovation (CFI) $3,986,163 and Alberta Enterprise and Advanced Education $3,986,163.
4) PI, NSERC Discovery Grant, "Fundamental understanding and development of novel high dielectric constant ALD gate oxides on gallium nitride substrates for MOSFET power conversion applications", 2012/4-2017/3, Total Funding $120,000.
5) Principal Applicant, NSERC Engage Plus Grant (Norcada), "Passivating coatings and novel heat elements for electrical devices", 2016/7 2017/1, Total Funding $25,000.
6) Co-applicant with Dr. T. Thundat, Alberta Innovates Bio Solutions, "Converting Nanocellulose into High value 1Dimentional Nanocarbons for Energy Storage", 2016/7 2016/6, Total Funding $123,500. This proposal entailed the development of an ALD alumina coating to coat cellulose.
7) Co-PI with Dr. Doug Barlage, Alberta Innovation and Science, Nanobridge, "Semiconductor Transistors for High Efficiency Power Conversion", 2014/8-2016/3, Total Funding $150,000.
8) Principal Applicant, NSERC Engage Grant (Norcada), "Passivating coatings for electrical devices", 2015/8 - 2016/1, Total Funding $25,000.
9) Coinvestigator, Dr. Doug Barlage PI, NSERC I2I, "Indium Free Zinc Oxide Thin Film Transistors for Emerging Applications", 2015/1-2015/12, Total Funding $125,000.
10) PI, Alberta Innovation and Science, Nanobridge, "High Q Factor AT-Cut Quartz Crystal Microbalance Femtogram Mass Sensor" nanoBridge, 2014/8-2015/9 Total Funding $75,000.
11) PI with Dr. Thundat and two other applicants, NSERC Strategic Grant, "NanoCatalytic Energy Cell", 2011/9-2014/9, Total Funding $559,500.
12) PI, Alberta Innovates Technology Solutions, Nanoworks (Micralyne), "Wafer Level Packaged MEMS Inertial Sensors with Through Silicon Vias for Use in Seismic Sensing Applications", 2011/3-2014/7, Total Funding $1,200,000.
13) PI, CRC Chair in Nanofabrication, 2009/7 - 2014/6, Total Funding $1,400,000.
14) Nanofabrication Research Chair, Alberta Ingenuity Scholar Program, 2009/7 - 2014/6, Total Funding $1,020,000.
15) Co-applicant with Dr. Walid Moussa PI, Alberta Innovates Technology Futures, Nanoworks (Scanimetrics), "Nanoscale interconnect technology for nonintrusive testing in oil sands" 2011/9-2013/9, Total Funding $1,300,000.
16) PI with Dr. T. Thundat and other professors, NSERC RTI, "Infra-red Fourier vacuum spectrometer for solar cell and thin film research", 2012/3 2013/3 Total Funding $117,001.
17) PI, NSERC Discovery Grant, "Copper slurry for chemical mechanical polishing," 2008/4-2012/3, Total Funding $80,000.
18) PI, Alberta Ingenuity MISTRI, "Miniaturized pH Probe for Metabolic Acidosis", 2010/1-2011/12, Total Funding $87,937.

19) PI, Alberta Ingenuity Nanoworks (Scanimetrics), "Nanoscale Interconnect Technology to Enhance High-Speed Communcations", 2009/9-2010/8, Total Funding $750,000.

Publications

(Dr. Cadien's graduate students or direct reports (industry) are in bold)

Refereed Journal Publications

(a75) B. Cao, X. He, J. B. Sorge, A. Lalany, **K. Ahadi**, **A. Afshar**, B. C. Olsen, T. C. Hauger, Md H. Mobarok, P. Li, K. Cadien, M. J. Brett, E. J. Luber, and J. M. Buriak, "Understanding the Effects of a High Surface Area Nanostructured Indium Tin Oxide Electrode on Organic Solar Cell Performance", ACS Applied Materials & Interfaces, 9 (2017) 38706-38715.

(a74) P. Motamedi, K. Bosnick, K. Cui, K. Cadien, and J. D. Hogan, "Growth and Characterization of Metastable Hexagonal Nickel Thin Films via Plasma-Enhanced Atomic Layer Deposition", ACS Applied Materials & Interfaces, 29 (2017) 24722-24730.

(a73) **E. Rafie Borujeny, M. Miao, H. Pirayesh**, Z. Xu, and K. Cadien, "An investigation of the deposition of ceria on silica by quartz crystal microbalance: Observations on the effect of many body interactions", Colloids and Surfaces A-Physicochemical and Engineering Aspects, 522 (2017) 207-217.

(a72) Z. Li, **K. Ahadi,** K. Jiang, B. Ahvazi, P. Li, A. Anyia, K. Cadien, and T. Thundat, "Freestanding hierarchical porous carbon film derived from hybrid nanocellulose for high-power supercapacitors", Nano Research, 10 (2017) 1847-1860.

(a71) S. Seif, T. Thundat, and K. Cadien,"Evaluation of efficiency factors and internal resistance of thermoelectric materials", International Journal of Energy Research, 41 (2017) 198-206.

(a70) K. Bosnick, P. Motamedi, T. Patrie, and K. Cadien, "Conformal Carbon Nanotube Coatings for Ceramic Composite Structures", MRS Advances, 2 (2017) 1499-1503.

(a69) M. Shen, A. Afshar, Y. Tsui,K. cadien, and D. Barlage, "Performance of Nanocrystal ZnO Thin-Film Schottky Contacts on Cu by Atomic Layer Deposition", IEEE Transactions on Nanotechnology, 16 (2017) 135-139.

(a68) V. Rezazadeh, K. Bothe, **A. Afshar**, K. Cadien and D. Barlage, "Defect Characterization of PEALD High-k ZrO_2 Films Fabricated on III-V Materials", IEEE Transactions on Semiconductor Manufacturing, 29 (2016) 355-362.

(a67) A. Ma, M. Shen, **A. Afshar**, Y. Tsui, K. Cadien and D. Barlage, "Interfacial Contact Effects in Top Gated Zinc Oxide Thin Film Transistors Grown by Atomic Layer Deposition" IEEE Transactions on Electron Devices, 63 (2016) 3540-3546.

(a66) **T. Muneshwar**, G. Shoute, D. Barlage and K. Cadien, "Plasma enhanced atomic layer deposition of ZnO with diethyl zinc and oxygen plasma: Effect of precursor decomposition", Journal of Vacuum Science & Technology A, 34 (2016) 050605-1 to -7.

(a65) **E. Rafie Borujeny**, Z. Xu, P.Li and K.Cadien, "Ceria coated silica particles: One step preparation and settling behaviour under the influence of colloidal and hydrodynamic interactions", Materials Chemistry and Physics, 173 (2016) 467-474.

(a64) **K. Ahadi** and K. Cadien," Ultra low density of interfacial traps with mixed thermal and plasma enhanced ALD of high-k gate dielectrics", RSC Adv., 6 (2016) 16301–16307.

(a63) **T. Muneshwar** and K.Cadien," AxBAxB… pulsed atomic layer deposition: Numerical growth model and experiments", J. Appl. Phys., 119 (2016) 085306-1 to -10.

(a62) **H. Pirayesh** and K. Cadien, "The Effect of Slurry Properties on the CMP Removal Rate of Boron Doped Polysilicon", ECS J. Sol. Stat. Technol., 5 (2016) P233-238. (AITF).

(a61) G. Shoute, **A. Afshar**, **T. Muneshwar**, K. Cadien and D. Barlage," Sustained hole inversion layer in a wide-bandgap metal-oxide semiconductor with enhanced tunnel current", Nature Comm., 7 (2016) DOI: 10.1038/ncomms10632 1-5.

(a60) **E. Rafie Borujeny**, **K. Dawkins**, P. Li, Z. Xu, and K. Cadien," Ceria coated silica particles: One step preparation and settling behaviour under the influence of colloidal and hydrodynamic Interactions", J. Mat. Chem. & Phys., 173 (2016) 467-474.

(a59) **T. Muneshwar** and K.Cadien," Low temperature plasma enhanced atomic layer deposition of conducting zirconium nitride films using tetrakis (dimethylamido) zirconium and forming gas (5% H2 + 95% N_2) plasma", JVSTA, 33 (2015) 031502-1 to -7.

(a58) **T. Muneshwar** and K.Cadien,"Influence of atomic layer deposition valve temperature on ZrN plasma enhanced atomic layer deposition growth", JVSTA, 33 (2015) 060603-1 to -5.

(a57) **P. Motamedi** and K.Cadien, "Structure–property relationship and interfacial phenomena in GaN grown on C-plane sapphire via PEALD", RSC Adv., 5 (2015) 57865-57874.

(a56) **P. Motamedi** and K.Cadien, "A route to low temperature growth of single crystal GaN on sapphire", J. Mat. Chem. C, 3 (2015) 7428-7436.

(a55) **P. Motamedi** and K.Cadien, "Structural and optical characterization of low-temperature ALD crystalline AlN", J. Crys. Growth, 421 (2015) 45-52.

(a54) **K. Dawkins**, B.W. Rudyk, Z. Xu and K. Cadien, "The pH-dependent attachment of ceria nanoparticles to silica using surface analytical techniques", Applied Surface Science, 345 (2015) 249-255.

(a53) **H. Pirayesh** and K. Cadien, "Chemical mechanical polishing in the dry lubrication regime: Application to conductive polysilicon", J. Mater. Proc. Tech., 220 (2015) 257-263.

(a52) **T. Muneshwar** and K. Cadien, "Probing initial-stages of ALD growth with dynamic in-situ spectroscopic ellipsometry", Applied Surface Science, 328 (2015) 344-348.

(a51) S. S. Djokic´ and K. Cadien, "Galvanic Deposition of Silver on Silicon Surfaces from Fluoride Free Aqueous Solutions", ECS Electrochemistry Letters, 4 (6) (2015) D11-D13.

(a50) M. Benlamri, K. Bothe, A. Ma, G. Shoute, **A. Afshar**, H. Sharma, A. Mohammadpour, M. Gupta, K. Cadien, Y. Tsui, K. Shankar and D. Barlage, "High-mobility solution-processed zinc oxide thin films on silicon nitride", Physica Status Solidi RRL, 8 (2014) 871-875.

(a49) **P. Motamedi** and K. Cadien, "XPS analysis of AlN thin films deposited by plasma enhanced atomic layer deposition", Applied Surface Science, 315 (2014) 104-109.

(a48) K. Voon, K. Bothe, **P. Motamedi**, K. Cadien and D. Barlage, "Polarization change properties of low-temperature atomic layer deposition of AlN on GaN", J. Phys. D: Appl. Phys., 47 (2014) 345104 (5pp).

(a47) **H. Pirayesh** and K. Cadien, "High-rate chemical mechanical polishing of boron-doped polycrystalline silicon", ECS J. of Solid State Science and Technology, 3 (2014) P213-P218.

(a46) **A. Afshar** and K. Cadien, "Growth mechanism of atomic layer deposition of zinc oxide: A density functional theory approach", Appl. Phys. Lett., 103 (2013) 251906.

(a45) A. Ma, M.Gupta, **A. Afshar,** G. Shoute, Y. Y. Tsui, K. Cadien, D. Barlage, " Schottky barrier source-gated ZnO thin film transistors by low temperature atomic layer deposition", Appl. Phys. Lett., 103 (2013) 253503.

(a44) K. Bothe, P. von Hauff, **A. Afshar, A. Foroughi-Abari,** K. Cadien and D. Barlage, "Electrical comparison of ZrO_2 and HfO_2 films on GaN for MOS applications", IEEE Trans. on Electron Devices, 60 (2013) 4119-4124.

(a43) M. P. Nielsen, **A. Afshar**, K. Cadien and A. Y. Elezzabi, "Plasmonic materials for metal-insulator-semiconductor-insulator-metal nanoplasmonic waveguides on silicon-on-insulator platform", Optical Materials, 36 (2013) 294-298.

(a42) **L. Nolan** and K. Cadien, "Chemically-enhanced synergistic wear: a copper chemical mechanical polishing case study", Wear, 307 (2013) 155-163.

(a41) S.R. Jim, **A. Foroughi-Abari**, K.M. Krause, P. Li, M. Kupsta, M.T. Taschuk, K.C. Cadien and M.J. Brett, "Ultrathin-layer chromatography nanostructures modified byatomic layer deposition", Journal of Chromatography A, vol. 1299 (2103) 118–125.

(a40) P. von Hauff, **A. Afshar, A. Foroughi-Abari**, K. Bothe, D. Barlage and K. Cadien, "ZrO_2 on GaN metal oxide semiconductor capacitors via plasma assisted atomic layer deposition", Appl. Phys. Lett., 102 (2013) 251601.

(a39) S.S. Djokic, **L. Nolan,** K. Cadien and T. Thundat, "Electroless deposition of copper and silver on niobium surfaces", ECS Electrochem. Lett., 2 (March 2013) D16-D18.

(a38) K. Bothe, P. von Hauff, **A. Afshar, A. Foroughi-Abari**, K. Cadien, and D. Barlage, "Capacitance modeling and characterization of planar MOSCAP devices for wideband-gap semiconductors with high-k dielectrics", IEEE Trans. on Electron Devices, 59 (2012) 2662-2666.

(a37) **L. Nolan** and K. Cadien, "Copper CMP: The relationship between polish rate uniformity and lubrication", ECS J. Solid State Science and Tech., 1 (2012) 157-163.

(a36) P. Maraghechi, **A. Foroughi-Abari**, K.Cadien, A.Y. Elezzabi, "Observation of resonant tunneling phenomenon in metal-insulator-insulator-metal electron tunnel devices", Appl.Phys.Lett., 100, issue:11 article:113503 (2012).

(a35) **F. Lin, L. Nolan**, Z. Xu, K. Cadien," A Study of the colloidal stability of mixed abrasive slurries of silica and ceria nanoparticles", J. Electrochem. Soc., 159 (2012) H482-H489.

(a34) **A. Foroughi-Abari, C. Xu,** and K. Cadien, "The effect of argon pressure, residual oxygen and exposure to air on the electrical and microstructural properties of sputtered chromium thin films", Thin Solid Films, 520, 1762-1767 (2012).

(a33) **A. Foroughi-Abari** and K. Cadien, "In-situ spectroscopic ellipsometry study of plasma-Enhanced ALD of Al_2O_3 on chromium substrates", J. Electrochem. Soc., 159, D59-64 (2012).

(a32) P. Maraghechi, **A. Foroughi-Abari**, K. Cadien and A. Y. Elezzabi," Enhanced rectifying response from metal-insulator-insulator-metal (MIIM) junctions", Applied Physics Letters, 99, issue:25 article:253503 (2011).

(a31) P. Maraghechi, K. Cadien, and A. Y. Elezzabi, "A novel lift-off technique for nano- to microscale fabrication", IEEE Transactions on Nanotechnology, 10 (2011) 822-826.

(a30) **A. Foroughi-Abari** and K. Cadien, "Growth, structure and properties of niobium oxide thin films", Thin Solid Films, 519 (2011) 3068-3073.

(a29) J.H. Han, **A. M. Bowen, T.N. Andryushchenko**, R.P. Chalupa, **A.E. Miller**, H.S. Simka, K.Cadien, S. Shankar, "Effects of viscosity-dependent diffusion in the analysis of rotating disk electrode data", Journal of Applied Electrochemistry, 38 (2008) 1-5.

(a28) **P. S. Davids, B. A. Block, M. R. Reshotko,** and K. Cadien, "Surface plasmon induced polarization rotation and optical vorticity in a single mode waveguide", Optics Express, 15, (2007) 9476-9485.

(a27) **P. S. Davids, B. A. Block,** and K. Cadien , "Surface plasmon polarization filtering in a single mode dielectric waveguide", Optics Express, 13 (2005) 7063-7069.

(a26) J. Hawk, **A. E. Miller**, K. Cadien, S.B. Akonko, D.Y. Li, M. Ziomek-Moroz "Effects of $K_3[Fe(CN)_6]$ slurry's pH value and applied potential on tungsten removal rate for chemical-mechanical planarization application", Wear, 259 (2005) 1299-1307.

(a25) M. Ziomek-Moroz, **A. Miller**, J.Hawk, K. Cadien, and D. Y. Li, " An overview of corrosion-wear interaction for planarizing metallic thin films" Wear, 255 (2003) 869-874.

(a24) M. Moinpour, A. Tregub, A. Oehler and K. Cadien, "Advances in characterization of CMP consumables", MRS Bulletin, 27 (2002) 766-771.

(a23) Y-J Lii, J. Jorne, K. Cadien, and **J. Schoenholtz**, "Plasma etching of silicon in SF_6 – experimental and reactor modeling studies", J. Electrochemical Soc., 137 (1990) 3633-3639.

(a22) Y-J Lii, J. Jorne, K. Cadien, and **J. Schoenholtz**, "Plasma etching of silicon in SF_6 – effect of discharge power and electron density on etching rate", J. Electrochemical Soc., 135 (1988) C126.

(a21) **S. Sivaram** and K. Cadien, "Kinetics of rapid thermally nitride titanium", J. Electrochemical Soc., 134 (1987) C467-C468.

(a20) R.H.Higuchi-Rusli, J.C.Corelli, A.J.Steckl, and K. Cadien, "Development of a test bed system for high melting temperature alloy fabrication and mass spectroscopy analysis of liquid metal ion sources", J. Vac. Sci. Technol., A5 (1987) 2073-2076.

(a19) R.H. Higuchi-Rusli, J.C. Corelli, A.J. Steckl, and K. Cadien, "Development of boron liquid metal ion source for focused ion beam system", J. Vac. Sci. Technol., B5 (1987) 190-194.

(a18) K. Cadien, **S. Sivaram**, and C. Reitsema , "Dry etching of $TiSi_2$", J. Vac. Sci. Technol., A4 (1986) 739-743.

(a17) J. Sugiura, W.-J. Lu, K. Cadien, and A.J. Steckl, "Reactive ion etching of SiC thin films using fluorinated gases", J. Vac. Sci. Technol., B4 (1986) 349-354.

(a16) **S.Sivaram**, P.J.Ficalora and K. Cadien, "An extension of the Engel-Brewer correlation to transition metal silicides", J. Appl. Phys., 58 (1985) 1314-1319.

(a15) K. Cadien, B. Muddle, and J.E. Greene, "Phase transitions in ion-mixed metastable $(GaSb)_{1-x}$ Ge_x semiconducting alloys", J. Appl. Phys., 55 (1984) 4177-4186.

(a14) K. Cadien and D. Losee, "A method for eliminating hillocks in integrated circuit metallizations", J. Vac. Sci. Technol., B2 (1984) 82.

(a13) K. Cadien and J. Greene, "Crystal growth and controlled doping of epitaxial Ge films on (100) GaAs by sputter deposition", J. Crystal Growth, 61 (1983) 15-22.

(a12) T.N. Krabach, N. Wada, M.V. Klein, K. Cadien, and J.E. Greene, "Raman scattering from metastable $(GaSb)_{1-x}$ Ge_x semiconducting films", Solid State Commun., 45 (1983) 895-898.

(a11) K. Cadien and J.E. Greene, "Single phase polycrystalline metastable $(GaSb)_{1-x}$ Ge_x alloys from annealing of amorphous mixtures: ion mixing effects during deposition", Appl. Phys. Lett., 40 (1982) 329-331.

(a10) G. Bajor, K. Cadien, M. Ray, J.E. Greene, and P.S. Vijayakumar, "Growth of high quality epitaxial Ge films on (100) Si by sputter deposition", Appl. Phys. Lett., 40, (1982) 696-698.

(a9) J.E. Greene, S. Barnett, K. Cadien, and M. Ray, "Growth of single-crystal GaAs and metastable $(GaSb)_{1-x}$ Ge_x alloys by sputter deposition: ion surface interaction effects", J. Crystal Growth, 56 (1982) 389-401.

(a8) S. Shah, K. Cadien, and J.E. Greene, "GaSb-Ge pseudobinary phase diagram", J.Electronic Materials, 11 (1982) 53-58.

(a7) K. Cadien, M. Ray, S. Shin, J. Rigsbee, S. Barnett, and J. Greene, "Ion mixing effects during film deposition: growth of metastable semiconducting and metallic alloys", J.Vac.Sci.Technol., 20 (1982) 370-371.

(a6) J.E. Greene, K. Cadien, D. Lubben, G. Hawkins, G. Erikson, and J. Clarke, "Epitaxial Ge/GaAs heterostructure by scanned CW laser annealing of a-Ge layers on GaAs", Appl. Phys. Lett., 39 (1981) 232-234.

(a5) K. Cadien, A.H. Elthoukhy, and J.E. Greene, "Growth of single-crystal metastable $(GaSb)_{1-x}$ Ge_x films", Appl. Phys. Lett., 38 (1981) 773-775.
(a4) K. Cadien, A.H. Elthoukhy, and J.E. Greene, "Growth and thermal stability of single-crystal metastable $(GaSb)_{1-x}$ Ge_x films", Vacuum, 31 (1981) 253-258.

(a3) K. Cadien, J. Zilko, A.H. Eltoukhy, and J.E. Greene, "Growth of single-crystal metatstable $(InSb)_{1-x}$ Bi_x and $(GaSb)_{1-x}$ Ge_x semiconducting films", J. Vac. Sci. Technol., 17 (1980) 441-444.

(a2) S. Fulop, K. Cadien, M.J. Luton, and H.J. McQueen, "A servo-controlled hot-torsion machine for hot-working studies", J. Testing and Evaluation, 5 (1977) 419-426.

(a1) M.J. Luton and K. Cadien, "Thermally activated flow of polycrystalline copper at elevated temperatures", J. Metals, 28 (1976) A64.

Recent Conference Proceedings

(Presenter is underlined)
(c15) K. Bothe, **A. Afshar**, A. Ma, K. Voon, **P. Motamedi**, K. Cadien, Y. Tsui and D. Barlage, "Selective Deposition of Low Temperature AlN Ohmic Contacts for GaN Devices", *Proc. CS Mantech Conference*, May 19th - 22nd, 2014, Denver, Colorado,

http://gaasmantech.com/Digests/2014/papers/103.pdf , (2014) pp. 369-371.

(c14) M. Shei, **A. Afshar**, M. Gupta, G. Shoute, K. Cadien, Y. Tsui and D. Barlage, "Electrical Characteristics of TiW/ZnO Schottky contact with ALD and PLD", *MRS Proceedings*, Vol. 1635 (2014) 127-132.

(c13) G. Deans, S. McDonald, C. Baer and K. Cadien, "Solar Wafer Emitter Measurement by Infrared Reflectometry for Process Control: Implementation and Results", *40th IEEE Photovoltaic Specialists Conference*, Denver, Colorado, June 8-13 (2014) 3 pages.

(c12) G. Shoute, A. Ma, **A. Afshar,** K. Cadien and D. Barlage, "Low-Voltage and Low-Cost ZnO based Ultra-Thin-Film Transistors", *Proc. CS MANTECH Conference*, May 19th - 22nd, 2014, Denver, Colorado, USA, http://gaasmantech.com/Digests/2014/papers/104.pdf , (2014) pp. 373-376.

(c11) K. Voon, K. Bothe, **P. Motamedi**, K. Cadien and D. Barlage, "Engineered Tunneling Contacts with Low-Temperature Atomic Layer Deposition of AlN on GaN", *Proc. CS MANTECH Conference*, May 19th - 22nd, 2014, Denver, Colorado, USA, http://gaasmantech.com/Digests/2014/papers/049.pdf , (2014) pp. 175-178.

(c10) A. Ma, M. Benlamri, A. Afshar, G. Shoute, K. Cadien, and D. Barlage, "High Breakdown Voltage ZnO Thin Film Transistors Grown by Low Temperature Atomic Layer Deposition", *Proc. CS MANTECH Conference,* May 19th - 22nd, 2014, Denver, Colorado, USA, http://gaasmantech.com/Digests/2014/index2014.html , (2014) pp 385-387.

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(g24) **K. Dawkins**, Z. Xu, and K. Cadien, "Removal of Ceria Particles from Silica Surfaces", Faculty of Engineering, Graduate Research Symposium, University of Alberta, Edmonton, June 19, 2014

(g23) M. Shei, **A. Afshar**, M. Gupta, G. Shoute, K. Cadien, Y. Tsui and D. Barlage, "Electrical Characteristics of TiW/ZnO Schottky contact with ALD and PLD", MRS Fall Meeting, Boston, Massachusetts, December 1-6, 2013.

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(g6) **A. Foroughi-Abari**, **A. Afshar,** B. Rayner and K. Cadien, "Application of ALD for Fabrication of Metal-Insulator-Metal Devices", 12th International Conference on ALD, Dresden, Germany, June 17-20, 2012.

(g5) **A. Foroughi-Abari**, G.B. Rayner (Kurt J. Lesker), and K.Cadien, "Applications of *in-situ* Analysis to ALD Nucleation and Growth of Alumina on Silver in an ALD-150LX Research System", International Conference on ALD, Boston, MA, Jun. 26-29,2011.

(g4) **A. Foroughi-Abari** and K. Cadien, "PEALD of Aluminum Oxide on Metal Substrates", MRS Spring Meeting, San Francisco, CA, Apr. 25-29, 2011.

(g3) **F. Lin**, Z. Xu, and K. Cadien, "Colloidal stability of nanoparticles and applications to CMP", Invited, 16th Int. Conf. on CMP, Lake Placid, NY, Aug. 7-10, 2011.

(g2) K. Cadien, " Science and Technology of CMP", **Keynote**, 16th International Conference on Chemical-Mechanical Planarization, Lake Placid, NY, Aug. 7-10, 2011.

(g1) **L. Nolan** and K.Cadien, "Fluid flow characteristics in chemical mechanical polishing pads", COM 2010, Vancouver, BC, Oct. 3-6, 2010.

Service

University/Faculty Committees

General Appeals Committee, President's Representative, Faculty Appeal, July 28, 2014.

Assoc. Chair of Grad Studies, Dept. of Chem. & Mat. Eng., Univ. of Alberta, 2011- 2014.

Undergraduate Nanomaterials Advisor, Dept. of Chem. & Mat. Eng., Univ. of Alberta, 2009-14.

Graduate Scholarship Com., Fac. of Grad. Studies & Research, Univ. of Alberta, 2010-14.

Member, NSERC Competitive Manufacturing- Value Added Products and Processes Grants Selection Panel 2011-2013 and 2014.

Member of the Chair selection committee, Electrical and Computer Engineering, 2009 and 2014, Chemical and Materials Engineering, 2011-2012.

Provincial/Industrial Committees

Member, Board of Directors, Alberta Centre for Advanced Microelectronic and Nanotechnology Products, 2009- (acting chair, 2010) 2012.

Member, Advisory Committee, Samsung-MIT Manufacturing Center, MIT, Boston, Mass., 2012-2016.

Scientific Advisor, Scanimetrics, 2008- 2014.

Chair, Technical Advisory Board, NexPlanar, 2007- 2012.

Member, Technical Advisory Board, Aurora Control, 2011-2015.

Scientific Advisor, Micralyne, 2011-2014.

NanoBlue Devices, Founder, Chief Scientific Officer, 2013-

PROFESSIONAL MEMBERSHIPS

Fellow	IEEE
Member	American Vacuum Society
Member	Materials Research Society
Member	American Society of Metals
Member	APEGGA (The Association of Professional Engineers, Geologists and Geophysicists of Alberta)