

Dirk D. Brown

dirk@sc.edu

Over 30 years in general management, board-level oversight, and investment in technology companies undergoing rapid or comprehensive changes in strategy and/or operations. Over 15 years of experience in administering university-level programming related to entrepreneurship, innovation, and free enterprise. Specific strengths include (i) strategic and tactical market positioning and market penetration, (ii) new venture formation and financing, (iii) product development based on new technologies, (iv) intellectual property strategy and management, (v) joint development and licensing negotiations, (vi) assessing and building high-performance organizations, (vii) implementing scalable business processes and systems, and (viii) general management in changing external and internal environments.

University of South Carolina, Columbia, SC

Director, McNair Institute for Entrepreneurism and Free Enterprise 6/2017 – present

Director, Faber Entrepreneurship Center, Darla Moore School of Business 7/2011 – 5/2017

Faculty, International Business Department, Darla Moore School of Business 1/2022 - present

Faculty, Management Department, Darla Moore School of Business 7/2011 – 12/2021

Oversight of entrepreneurial and free enterprise activities at the University of South Carolina, Moore School of Business, and elsewhere within the State of South Carolina. This includes teaching, advising, coordinating internship programs, initiating and supporting joint ventures, developing entrepreneurial infrastructure (systems & processes), running commercialization projects, budget management & financing support. Reporting to the Provost with regular strategic update meetings with the President of the University, members of the Board of Trustees, and the Robert and Janice McNair Foundation.

- Drove the core teaching, consulting, and brand emphasis of the entrepreneurship and innovation programming first for the Moore School of Business and subsequently for the entire University of South Carolina under the office of the Provost.
- Vice-Chairman of The MIX (Midlands Technical Exchange) and active member of the Board of Advisors for the Kennedy Pharmacy Innovation Center (USC School of Pharmacy).
- Initiated and managed USC's Entrepreneurship Council to drive alignment around a number of university and statewide entrepreneurial initiatives (education, internships, research, economic development, etc.) with dean representation from every college and school at the University of South Carolina as well as the Office of the Vice President for Research, the Office of Economic Engagement and a wide range of state organizations.
- Course and curriculum development for several schools and colleges. Extensive teaching in the areas of entrepreneurship, intellectual property strategy & management, and management consulting. Thesis and dissertation advisor for several graduate students at USC. Participated in several endowed chair search committees.
- Consulted with state and federal government organizations and authored several capital market and commercialization studies. Regular speaker on the importance of entrepreneurship and free enterprise for economic development and the intersection of technology, business and policy.

Liquorem Holdings, Columbia, SC

4/2018 – present

Chairman and Managing Partner

Co-founded the company together with the CEO to acquire and commercialize patent-pending “PROOF® Hard Ice Cream”.

Pandoodle Corp., Columbia, SC and Mountain View, CA

Chairman and CEO

1/2009 - present

General management of a private company based on proprietary digital media technologies (developed internally, acquired, and licensed). Strategically positioned Pandoodle as the first company able to do cost-effective, fully personalized video. Negotiated the sale of Pandoodle IP assets to Oi2 Media Corp in May 2018 so that Pandoodle is now a holding company.

Neoconix (formerly Epic Technology), Sunnyvale, CA

Executive Vice President, Marketing & Corporate Strategy

6/2006 - 7/2009

CEO (Epic Technology)

1/2003 – 6/2006

Founded and ran a venture capital-funded company developing and manufacturing electrical connectors based on patented and proprietary technologies (developed internally). Built a strong base of recurring revenues from large electronics companies and then recruited a public company CEO to position the company for an exit. Remained on the Board of Directors and provided management support until 2009. Unimicron purchased the majority ownership of Neoconix in 2012.

High Connection Density (HCD), Sunnyvale, CA and Ithaca, NY

Executive Vice President, Operations and Marketing

1/1999 – 1/2003

Strategic planning and general management of all operations for a private company making electrical connectors and high-density electrical subsystems. Spun the company out of Cornell University’s Materials Science & Engineering Department with the CEO, a professor from Cornell, and relocated the company from Ithaca, NY to Sunnyvale, CA in 2000.

Advanced Micro Devices (AMD), Sunnyvale, CA

9/1995 – 1/1999

Member of Technical Staff, Advanced Interconnect Development

Process and patent development lead on thin metal films and metal interconnects for a global provider of microprocessors, flash memory devices, and silicon-based solutions.

Education

- Masters of Business Administration (MBA) San Jose State University, California, USA (1998)
- Ph.D. in Materials Science and Engineering Cornell University, New York, USA (1995)
- M.Eng. in Applied Physics Cornell University, New York, USA (1991)
- B.Sc. in Applied Physics/ Electrical Eng. Queen's University, Ontario, Canada (1990)

Fluent in French. Intermediate Japanese (Studied at Shibusawa Language School in Japan). Extensive coursework in German and Spanish.

General Experience

- Fellow of the Aspen Global Leadership Network (Liberty Fellowship class of 2014)
- Charter member of the C100 (the 100 most influential Canadian executives in Silicon Valley).
- South Carolina Research Authority (SCRA) Knowledge Economist Award.
- Over 35 patents in the areas of semiconductors, electronics, and digital media technology.
- Over 30 technical papers and journal articles from work at Neoconix, HCD, AMD, Cornell University, CSEM (Swiss Center for Microelectronics), and the National Research Council of Canada.
- Co-author of “Inventions = Money”, Grey-Gold Publishing, a handbook for patent engineers
- Co-authored two chapters on International Intellectual Property Strategy & Management in a book published by China International Intellectual Property Services in 2011.
- Member of the Licensing Executive Society (LES) 2010 - 2015.
- Member of the Joint Electron Device Engineering Council (JEDEC) from 2000-2003.
- Industry mentor for the Semiconductor Research Corporation from 1995 - 1999.
- Member of the Materials Research Society (MRS) from 1993-1999, Editor in 1997.

Selected Projects and Advisory Positions

Crescendo Capital, Columbia, SC – <u>Partner</u>	1/2018 – 1/2022
<i>Boutique investment firm focused on early-stage technology companies.</i>	
Omedym, Greenville, SC – <u>Strategic Advisor</u>	6/2019 – present
<i>Machine learning technology platform to support online demos for software companies.</i>	
Voterheads, Columbia, SC – <u>Board Member</u>	6/2014 – 6/2019
<i>Technology platform for local political analysis and engagement.</i>	
Red Sky, El Paso, TX – <u>Board Member</u>	5/2014 – 5/2020
<i>Non-profit economic development organization focused on commercializing medical device intellectual property.</i>	
Mymediatones, Palo Alto, CA - <u>Advising CMO</u>	5/2010 – 12/2022
<i>Patent-pending social media technologies for mobile applications. Focus on couponing.</i>	
National IP Taskforce, Houston, TX – Advisor/Member	6/2011 – 12/2015
<i>Non-profit economic development organization focused on national competitiveness in intellectual property strategy and management..</i>	
SOSB, Shady Side, MD – <u>Executive Advisor</u>	12/2007 – 12/2016
<i>Patent-pending biometric security technology in evaluation by federal & state agencies, etc.</i>	
Meta Logos, Santa Cruz, CA - <u>Executive Chairman</u>	9/2010 – 12/2012
<i>Patent-pending molecular analysis technologies based on ten years of academic research.</i>	
PhysioWave, Palo Alto, CA - <u>Interim CEO</u>	12/2007 - 5/2009
<i>Patent-pending medical device technologies developed by Stanford and U. of Washington.</i>	

Publications

- Inventions = Money, Dirk D. Brown and Dale C. Hogue, Grey Gold Advisors, 2016
- Patent Evaluation, Dirk D. Brown and Dale C. Hogue, Handbook of Best Practices in Intellectual Property Management, Chapter 12, CIIPS 2011
- Understanding Risk Factors: Title, Employee Rights, Patent Strength, Government Rights and Litigation, Dirk D. Brown and Dale C. Hogue, Handbook of Best Practices in Intellectual Property Management, Chapter 13, CIIPS 2011
- An Adaptable, High Performance LGA Connector Technology, Dirk D. Brown, Sanjin Hong, Zhineng Fan, John D. Williams, and Che-Yu Li, Electronic Components and Technology Conference, May 2002
- A Grain Structure Based Statistical Simulation of Temperature and Current Density Dependence of Electromigration, T.M. Korhonen, D.D. Brown, M.A. Korhonen, and C.-Y. Li, 1998 5th Int. Conf. On Solid-State and Integrated Circuit Technology Proc., Oct. 21-23, 1998, Beijing, China (ed. Min Zhang, King Ning Tu, IEEE press)
- Graded Ta/TaN/Ta Barrier for Copper Interconnects for High Electromigration Resistance, Takeshi Nogami, Young-Chang Joo, Shekhar Pramanick, Sergey Lopatin, Susan Chen, Todd Lukanc, Dirk Brown, Jeremias Romero, Joffre Bernard, Guarionex Morales, Robin Cheung, Advanced Metallization Conference, Oct. 1998
- Extendibility of Ion-Metal Plasma and Electroplating Technologies for Damascene-Based Copper Metallization, Sergey Lopatin, Dirk Brown, Takeshi Nogami, Susan Chen, Todd Lukanc, Axel Preusse, Imran Hashim, Advanced Metallization Conference, Oct. 1998
- A Low Temperature Integrated Aluminum Metallization Technology for ULSI Devices, Ted Guo, Liang Y. Chen, Dirk Brown, Paul Besser, Steve Voss, and Rod Mosely, Thin Solid Films 332, 1998, 319-324
- Characterization of the Cu/Barrier Metal Interface for Copper Interconnects, Takeshi Nogami, Jeremias Romero, Valery Dubin, Dirk Brown, Ercan Adem, Proceeding of IEEE International Interconnect Technology Conference: 298, 1998
- IMP Ta/Cu seed layer technology for high-aspect ratio via fill, and its application to multilevel single damascene copper interconnects (Invited), I. Hashim, V. Pavate, P. Ding, B. Chin, D. Brown, T. Nogami, Microelectronic Manufacturing, 23-24 September 1998, 3508-06
- Modeling Electromigration and Stress Migration Damage in Advanced Interconnect Structures (Invited), Dirk Brown, Mat. Res. Soc. Symp. Vol. 516, 1998
- Grain Structure-Based, Statistical Model for Electromigration Failure Distributions, D.D. Brown, S. Rzepka, M.A. Korhonen, and C.-Y. Li, Techcon'96, SRC Technical Conference, Phoenix, AZ, Sept. 1996
- Cluster Interactions and Stress Evolution During Electromigration in Confined Metal Interconnects, D.D. Brown, J.E. Sanchez, Jr., M.A. Korhonen, and C.-Y. Li, Appl. Phys. Lett. 67(3), 1995
- The Effect of Cluster Interactions on Electromigration Induced Stress Evolution in Confined Metal Lines, D.D. Brown, J.E. Sanchez, Jr., P.R. Besser, M.A. Korhonen, and C.-Y. Li, Mat. Res. Soc. Symp. Vol. 391, 1995

Publications (continued)

- The Effect of Cluster Interactions on Electromigration Induced Stress Evolution in Confined Metal Lines, D.D. Brown, J.E. Sanchez, Jr., P.R. Besser, M.A. Korhonen, and C.-Y. Li, *Mat. Res. Soc. Symp.* Vol. 391, 1995
- Effect of Cu and Si in Aluminum on Stress Change and on TiAl₃ Formation in Al Alloy/ Ti Bilayer Films During Annealing, D.D. Brown, J.E. Sanchez, Jr., P.R. Besser, M.A. Korhonen, and C.-Y. Li, *Mat. Res. Soc. Symp.*, Fall 1994
- Predicting and Comparing Electromigration Failure for Different Test Structures, D.D. Brown, M.A. Korhonen, P. Borgesen, and C.-Y. Li, *Mat. Res. Soc. Symp. Proc.* Vol. 338: 435-440, 1994
- Stress-Voiding Electromigration in Multilevel Interconnect Metallizations, C.-Y. Li, M.A. Korhonen, and D.D. Brown, *Mat. Res. Soc. Symp. Proc.*, Spring 1994
- Stress Evolution During Stress Migration and Electromigration in Passivated Interconnect Lines, P. Borgesen, M.A. Korhonen, D.D. Brown, C.-Y. Li, S. Rathore, and P.A. Totta
- Stress-Induced Phenomena in Metallization: 2nd international Workshop (ed. P.S. Ho, C.-Y. Li, P. Totta) *AIP Conference Proceedings* 305: 231-235, 1994
- Statistics of Stress Migration and Electromigration Failures of Passivated Interconnect Lines, M.A. Korhonen, P. Borgesen, D.D. Brown, C.-Y. Li, T.D. Sullivan, and P.A. Totta
- Stress-Induced Phenomena in Metallization: 2nd international Workshop (ed. P.S. Ho, C.-Y. Li, P. Totta) *AIP Conference Proceedings* 305: 15-32, 1994
- Analysis of Thermal Stress Induced Void Growth During Thermal Cycling, D.D. Brown, P. Borgesen, M.A. Korhonen, and C.-Y. Li, *Mat. Res. Soc. Symp. Proc.* 309: 223-228, 1993
- Microstructure Based Statistical Model of Electromigration Damage in Confined Metallizations in the Presence of Thermally Induced Stresses, M.A. Korhonen, P. Borgesen, D.D. Brown, and C.-Y. Li, *Journal of Applied Physics*, 74(8): 4995-5005, 1993
- Effects of Composition on Fatigue Crack Growth in Area Array Solder Joints, P. Borgesen, S.C. Bolton, B. Yost, J.G. Maggard, D.D. Brown, and C.-Y. Li, *ASME Advances in Electronic Packaging*, EEP 4-2: 969-977, 1993
- A Statistical Theory of Electromigration, C.-Y. Li, M.A. Korhonen, P. Borgesen, and D.D. Brown, *Proceedings of the 183rd Electrochemical Society Meeting*, Honolulu, HI, 1993
- Microstructure Based Modeling of Stress Migration and Electromigration Induced Failure Distributions, P. Borgesen, M.A. Korhonen, D.D. Brown, and C.-Y. Li, *Mat. Res. Soc. Symp. Proc.* 308: 255-266, 1993
- The Effect of Thermally Induced Stresses on Electromigration Lifetime of Near-Bamboo Interconnects, M.A. Korhonen, P. Borgesen, D.D. Brown, and C.-Y. Li, *Mat. Res. Soc. Symp. Proc.* 309: 121-126, 1993
- Thermal Stress Induced Void Formation in Narrow Passivated Cu Lines, D.D. Brown, P. Borgesen, D.A. Lillienfeld, M.A. Korhonen, and C.-Y. Li, *Mat. Res. Soc. Symp. Proc.* 239: 701-706, 1992
- Electromigration Damage by Current Induced Coalescence of Thermal Stress Voids, P. Borgesen, M.A. Korhonen, T.D. Sullivan, D.D. Brown, and C.-Y. Li, *Mat. Res. Soc. Symp. Proc.* 329: 683-688, 1992

Patents

- Method and System of Dynamically Analyzing, Modifying, and Distributing Digital Images and Video, David Ludwigsen, Dirk D. Brown, Mark Bradshaw (62/286,923, Filed 1/25/2016)
- Method of identifying and replacing an object or area in a digital image with another object or area, David Ludwigsen, Dirk D. Brown, Robert Glassett, Jason Griffith, Mark Bradshaw (14/209,361 Filed 3/15/2014)
- User customized animated video and method for making the same, Dirk D. Brown, David Ludwigsen, Loch T. Brown, Christopher James MacDonald, Harrison Rose, Jeffrey Alan Amdur, Robert John Glassett (US8963926B2, Granted 2/24/2015)
- User customized animated video and method for making the same, Dirk D. Brown, David Ludwigsen, Loch T. Brown, Christopher James MacDonald, Harrison Rose, Jeffrey Alan Amdur, Robert John Glassett (US20110064388)
- Virtual coupon delivery from coupon server to ACH to POS actuated by mobile phone scan of QR code, Carl Ernest Kent, Dirk Brown (US20150379552A1)
- Method for forming MEMS grid array connector, Dirk D. Brown, John D. Williams, Eric M. Radza (Application US20050120553A1)
- Coaxial elastomeric connector system, Che-Yu Li, Zhineng Fan, Dirk D. Brown (US6712620B1, Granted 3/30/2004)
- Electrical connector and method for making, Dirk D. Brown, John D. Williams, Hongjun Yao, Hassan O. Ali, Eric Radza (WO2004093252A2)
- Connector for making electrical contact at semiconductor scales, Dirk D. Brown, John D. Williams, Eric M. Radza (US7244125B2, Granted 7/17/2007) also filed internationally as WO2005057652A2
- Land grid array connector, Dirk D. Brown, John D. Williams, Hongjun Yao, Hassan O. Ali (WO2004112451A1)
- Structure and process for a contact grid array formed in a circuitized substrate, Dirk Dewar Brown, John David Williams, William B. Long (US20100167561A1)
- Small array contact with precision working range, Dirk Brown, John Williams (US20050227510A1) also filed in Europe as EP1698024A1 and internationally as WO2005057735A1
- Method and system for batch manufacturing of spring elements, Dirk Dewar Brown, John David Williams, William B. Long, Tingbao Chen (US7758351B2, Granted 7/20/2010)
- Contact grid array formed on a printed circuit board, Dirk D. Brown, John D. Williams (US7113408B2, Granted 9/26/2006)
- Circuitized connector for land grid array, Dirk D. Brown, John D. Williams, Hongjun Yao, Hassan O. Ali (US6869290B2, Granted 3/22/2005)
- Land grid array including heterogeneous contact elements, Dirk D. Brown, John D. Williams, Hongjun Yao (US7070419B2, Granted 7/4/2006)

Patents (continued)

- Remountable connector for land grid array packages, Dirk D. Brown, John D. Williams, Hongjun Yao, Hassan O. Ali (US6916181B2, Granted 7/12/2005)
- Structure and process for a contact grid array formed in a circuitized substrate, Dirk D. Brown, John D. Williams, William B. Long (US7628617B2, Granted 12/8/2009)
- High Capacity Memory Module with Built-In Performance Enhancing Features, Sharon Moriarty, Zhineng Fan, Dirk Brown, Che-Yu Li (US6661690B2, Granted 12/9/2003)
- Thermally Enhanced Interposer and Method, Che-Yu Li, Zhineng Fan, Dirk Brown (US6712621B2, Granted 3/30/2004)
- High Capacity Memory Module with Built-In High Speed Bus Terminations, Dirk D. Brown, Weimin Shi, Thomas L. Sly (US6172895B1, Granted 1/9/2001)
- Semiconductor metalization barrier, Sergey D. Lopatin, Shekhar Pramanick, Dirk D. Brown, (US6144099A, Granted 11/7/2000)
- Dielectric adhesion enhancement in damascene process for semiconductors, Dirk D. Brown (US6251772B1, Granted 6/26/2001)
- Method of improving Cu damascene interconnect reliability by laser anneal before barrier polish, Takeshi Nogami, Dirk D. Brown, Sergey Lopatin (US6103624A, Granted 8/15/2000)
- Method for forming semiconductor seed layers by high bias deposition, John A. Iacoponi, Dirk D. Brown, Takeshi Nogami (US6261946B1, Granted 7/17/2001)
- Method and apparatus for simultaneously improving the electromigration reliability and resistance of damascene vias using a controlled diffusivity barrier, Dirk D. Brown (US6306732B1, Granted 10/23/2001)
- Method for forming semiconductor seed layers by inert gas sputter etching, John A. Iacoponi, Dirk D. Brown, Takeshi Nogami (US6228754B1, Granted 5/8/2001)
- Semiconductor interconnect interface processing by high pressure deposition, John A. Iacoponi, Dirk D. Brown, Takeshi Nogami (US6080669A, Granted 6/27/2000)
- Semiconductor interconnect interface processing by pulse laser anneal, Dirk D. Brown, Shekhar Pramanick, Takeshi Nogami (US6143650A, Granted 11/7/2000)
- Method for fabricating protected copper metallization, Dirk D. Brown, Todd Lukanc, Takeshi Nogami (US6066557A, Granted 5/23/2000)
- Method of forming a void free copper interconnects, Christy Mei-Chu Woo, Dirk Brown, Young-Chang Joo, Imran Hashim (US6121141A, Granted 9/19/2000)
- Damascene metal interconnects using highly directional deposition of barrier and/or seed layers including (III) filling metal, Dirk Dewar Brown, Takeshi Nogami, Guarionex Morales (US6281121B1, Granted 8/28/2001)
- Method for forming conformal barrier layers, Young-Chang Joo, Dirk D. Brown, Simon S. Chan (US6124203A, Granted 9/26/2000)
- Dual barrier and conductor deposition in a dual damascene process for semiconductors, Shekhar Pramanick, Dirk Brown, John A. Iacoponi (US6239021B1, Granted 5/29/2001)

Patents (continued)

- Method for fabricating dual layer protective barrier copper metallization, Takeshi Nogami, Dirk D. Brown (US6059940A, Granted 5/9/2000)
- Method for forming in-situ implanted semiconductor barrier layers, Dirk Brown, John A. Iacoponi (US6146993A, Granted 11/14/2000)
- Method for implanting semiconductor conductive layers, Shekhar Pramanick, Dirk Brown, John A. Iacoponi, Christy Mei-Chu Woo (US6117770A, Granted 9/12/2000)
- Self-aligned semiconductor interconnect barrier and manufacturing method therefor, Kai Yang, Takeshi Nogami, Dirk Brown, Shekhar Pramanick (US6734559B1, Granted 5/11/2004)
- Multi-stage method for forming optimized semiconductor layers, Dirk D. Brown, John Iacoponi (US6187670B1, Granted 2/13/2001)
- Copper interconnect methodology for enhanced electromigration resistance, Takeshi Nogami, Shekhar Pramanick, Dirk Brown (US6022808A, Granted 2/8/2000)