

ADAM L. COHEN

Dallas, Texas

OVERALL ACHIEVEMENT SUMMARY

- Highly innovative executive, entrepreneur, engineer, and professor with 28 years of technology and senior management experience spanning 3-D printing, medical devices, mechanical engineering, complex capital equipment, and business development and marketing of breakthrough products
- Brought to market three different 3-D printing technologies: Stereolithography (3D Systems), 3D Printing (MIT/Soligen), MICA Freeform (USC/Microfabrica)
- Founded Microfabrica Inc. to bring to market a breakthrough mass production 3-D printing technology for manufacturing highly-miniaturized devices with unprecedented complexity; as the company's CEO, raised \$17M in equity funding
- Led Microfabrica's successful entry into the medical device business, landing major customers and a \$5.1M NIH grant to develop robotically-manipulated devices for minimally-invasive cardiac surgery, and helping to land an equity investment by top-tier medical device VCs Versant Ventures and InterWest Partners
- Co-founded and served as Vice President of AMEX-traded Soligen Technologies, ranked as one of Los Angeles' 50 fastest-growing tech companies; shipped 3-D printing equipment just seven months after starting development
- At product line/program manager at 3D Systems, led the team that developed the first commercial 3-D printing system and the company's first successful product, generating over \$100M in revenue
- Inventor on nearly 70 U.S. patents mostly related to 3-D printing, with many pending
- At Microfabrica and USC, brought in \$10M in contracts and grants from NIH, DARPA, and NSF
- Founded a 3-D printing consulting/publishing firm, publishing the first industry periodical and directory
- Clinical Associate Professor of Mechanical Engineering at SMU

SKILLS AND EXPERIENCE SUMMARY

- Senior management of high technology companies, including engineering, R&D, IP, business development, and marketing
- Medical devices: business development, product development, market and competitive analysis, clinician interface
- Product line and program management of all engineering functions (mechanical, electrical, optical, software, process/materials) in the development and commercialization of sophisticated capital equipment and processes for 3-D printing and microfabrication
- Systems engineering and problem solving
- Experienced or familiar with most traditional and nontraditional manufacturing processes
- Proficient with SolidWorks, Visio, Microsoft Project, and Microsoft Office

EXPERIENCE

Clinical Associate Professor, 1/13-present
Visiting Clinical Research Assistant Professor, 10/11-12/12
Department of Mechanical Engineering, Lyle School of Engineering, SMU, Dallas,
Texas

SMU is a private university with campuses in Texas and New Mexico.

- Director, Laboratory for Additive Manufacturing, Robotics, and Automation
- Awarded an NSF National Robotics Initiative \$640K grant to develop Fiber Encapsulated Additive Manufacturing, a next-generation multi-material 3-D printing technology to manufacturing active structures for robotics and other applications. Invited to present research at the Army Research Lab, Naval Research Lab, and Raytheon
- Awarded a sponsored research program contract by a major materials manufacturer to develop a new process for 3-D printing of advanced elastomers
- Awarded a Lyle Seed Funding grant to develop a new 3-D printing process that overcomes some of the problems with selective laser sintering
- Awarded a University Research Council grant to demonstrate a novel robotic steerable cannula for minimally invasive medical procedures; mentored a senior design team to develop a prototype
- Advisor on a Dean's Research Council grant to develop 3-D printing using 'click' chemistry
- Member of the editorial board of the journal *3D Printing and Additive Manufacturing*
- Invited co-organizer of the 3D Printing and Additive Manufacturing topic at IMECE 2015
- Teaching courses in mechanical engineering and design, including CAD, robotics, and prototyping. Developed *Rapid Product Realization*, a new hands-on prototyping and manufacturing course

Founder and CEO, 11/10-present
Additive Insight LLC, Dallas, Texas

Additive Insight is a consultancy with special expertise in 3-D printing

- Consulting for 3-D printing end-users, startups, large companies, and investors
- Invited speaker at the Inside 3D Printing Conference and Expo, and the 3D Printer World Expo

Executive Vice President, Technology and CTO, 08/02-10/10
Founder, President, and CEO, 08/99-08/02
Microfabrica Inc., Van Nuys, California

Microfabrica is a venture-backed (>\$62M) technology company commercializing MICA Freeform (a.k.a. EFAB[®]), a proprietary 3-D printing technology for complex 3-D metal devices—including fully-assembled mechanisms—at the micro and millimeter scale. MICA Freeform is the 1st and only mass production 3-D printing technology, producing millions of identical parts every year. The company's main activities are development of minimally-

invasive surgical instrumentation and volume production of micro-probes for semiconductor testing.

- Founded Microfabrica and spun it out of the University of Southern California
- Negotiated an exclusive worldwide technology license and \$1.2 million DARPA subcontract
- Raised \$11.3M from Draper Fisher Jurvetson, DynaFund, Chevron, and others at a high valuation; in the post-9/11 environment, raised \$6M more with Partech as the lead investor at increased valuation
- Led the company to commercialize MICA Freeform, developing two generations of sophisticated automated capital equipment and solving major process problems
- Inventor on most of Microfabrica's original and licensed patents; granted ~60 U.S. patents with many pending
- Beginning in '06 as de facto VP of medical business development, led a major push into medical devices which proved critical to bringing in major funding from top-tier investors Versant and InterWest
- Initiated and managed as co-principal investigator a collaboration with Boston University and Harvard Medical School that won a \$5M NIH grant to develop new micro-devices for minimally-invasive robotic cardiac surgery. Microfabrica is currently working to commercialize a spin-off of this project
- Spearheaded medical market research and internal product definition activities
- Landed and managed Microfabrica's first medical contract (a miniature biopsy device for a major device company); brought in a contract with a major pharma company for drug delivery microneedles
- Interviewed dozens of physicians in a wide range of clinical specialties (e.g., interventional cardiology, neurosurgery/interventional neuroradiology, ophthalmic surgery, microsurgery, urology, drug delivery, endodontics), shadowed doctors in the OR, and attended medical conferences to identify unmet clinical needs and brainstorm new solutions
- Designed, simulated, and prototyped many new concept medical devices to stimulate interest, including devices for tissue removal and approximation
- Managed materials biocompatibility evaluation and program that culminated in successfully developing an implantable material compatible with MICA Freeform
- Recruited clinicians to the company's medical advisory board
- Made dozens of presentations at medical device companies, from startups to industry leaders
- Supervised Microfabrica's intellectual property/legal vice president
- Grew company to ~25 employees (currently >80)
- Managed the team that transitioned and scaled up the EFAB process to a production-ready platform
- Invented a novel electrochemical extrusion process and won ~\$1M in NSF Phase I and II SBIR grants
- Created a service to provide access to the company's process at reduced cost, managing the development of new software for customer use

- Authored/co-authored multiple conference papers, magazine articles, a book chapter on MEMS, and a major white paper on EFAB for medical devices, led marketing communications activities

Project Leader, 04/96-04/00

USC/Information Sciences Institute, Marina del Rey, California

ISI is a world-renowned research institute operated by the University of Southern California focused on networking technology (it played a major role in developing the Internet), robotics, artificial intelligence, and electronics packaging, and operates the MOSIS semiconductor fabrication service.

- Invented EFAB technology, a microscale metal mass production 3-D printing process
- Managed a team of full-time researchers and a doctoral student to bring EFAB from idea to reality in about 18 months, while developing two generations of EFAB process equipment
- Landed \$3.6M in DARPA contracts to develop EFAB along with the world's smallest (~2 mm diameter) electrical generator with no moving parts
- Conceptualized, specified, and managed the development of enabling software allowing photomasks to be generated from 3-D CAD data
- Presented widely on EFAB, including invited presentations at major corporations, research institutes, conferences, and workshops (e.g., NIST, DARPA); invited to write a chapter for *The MEMS Handbook*
- Prior to the development of EFAB, worked with a prizewinning roboticist to develop an "intelligent motion surface" micro-robotic device for micro-manipulation and assembly

Co-founder, Vice President R&D, de facto VP Marketing, 10/91-03/96

Soligen Technologies, Inc., Northridge, California

Soligen was the 1st company to commercialize MIT's advanced "3D Printing" technology, involving jetting of binder onto a powder bed. The company developed equipment and operated a contract manufacturing service which allowed functional parts to be fabricated in days by casting metal into ceramic molds produced automatically from CAD data. Soligen went public and traded on the American Stock Exchange.

- Negotiated worldwide exclusive field-of-use license with MIT
- Co-developed the business plan, performed market research, and developed a marketing plan
- Transferred technology from MIT's lab and wrote product hardware and software specifications for a sophisticated, automated manufacturing system
- Managed the engineering team that brought the first system from concept to market in just seven months
- Co-designed 1st and 2nd generation 3D Printing equipment, performed system engineering and subsystem development

- Created and managed the R&D department, developing and optimizing processes and materials
- Led the project to source a vendor of critically-needed inkjet printhead technology; negotiated a business relationship and managed the technology transfer
- Established the IP department; managed a successful resolution of a major, frivolous patent lawsuit
- Won a DARPA subcontract, then specified, designed, and managed the implementation of one of the earliest e-commerce systems
- Managed trade shows, developed marketing materials, and handled public relations

Founder and President, 02/91-10/92
F Cubed, Los Angeles, California

F Cubed was a consulting and publishing firm specializing in 3-D printing.

- Founded the company and launched and edited the 1st industry periodical (Rapid Prototyping Report) on 3-D printing technologies and applications, and the 1st 3-D printing industry directory
- Responsible for marketing, research, writing, publishing, and administration
- Built up circulation and sold the newsletter and directory to an established publisher, remaining editor for an additional year
- Established a reputation as a 3-D printing authority, consulting/lecturing at UCLA and for major corporations

Product Line/Program Manager, 11/88-02/91

Project Engineer, 03/88-10/88

Process Development Engineer, 09/87-02/88

3D Systems, Inc., Valencia, California

3D Systems is the pioneer and leader of the 3-D printing industry. The company develops and markets products for a wide range of 3-D printing technologies and a wide range of markets.

- Managed the development, from concept to production, of complex automated stereolithography equipment: a breakthrough technology that created an entirely new industry
- Led the team that developed the SLA-250, the company's primary product for years and the first workhorse of the 3-D printing industry, with an installed base of ~ 600 units and sales > \$100M
- Assembled a five-person program management department supervising the efforts of some 40 professionals in mechanical, electrical, software, process, materials, and optical engineering
- Exercised primary responsibility for engineering support of 3D Systems' primary product line
- Served as primary engineering liaison with marketing, production, purchasing, quality, field service

- Developed requirements and specifications, provided conceptual design and systems engineering, and managed development projects for complex systems, software releases, and field retrofits
- Soon after starting, was given responsibility for the training, support, and field service of three major corporate Beta customers (Baxter, United Technologies, and Kodak).
- Briefly served as Electrical Engineering Manager
- Invented a new approach to stereolithography using thin films, and new 3-D software algorithms

Engineer-Mechanical Product Engineering, 08/86-08/87
Dataproducts Corporation, Woodland Hills, California

Dataproducts (later acquired by Hitachi) was a major domestic manufacturer of computer printers.

- Quickly became the in-house authority on xerographic technology and laser printer physics
- Diagnosed customer problems and designed and tested mechanical solutions for field deployment
- Designed and implemented custom apparatus for print quality testing

Software Engineer/Technical Supervisor, 08/80-06/82
Parmly Hearing Institute, Chicago, Illinois

The Parmly Hearing Institute is a medical research institute operated by Loyola University of Chicago.

- Developed machine language, Fortran, and Basic software to automate clinical experiments
- Discovered the “anti-pinhole” imaging phenomenon: published results in international optics journal and received a write-up in Scientific American
- Managed the Technical Department and supervised assistants

EDUCATION

Stanford Center for Professional Development

- The Cardiovascular System in Health & Disease: Fundamental Concepts for the Medical Device Industry, 2006

Massachusetts Institute of Technology, Cambridge, MA

- Bachelor of Science in physics, 1985
- Additional coursework in electrical engineering, optical engineering, and entrepreneurship
- Academic distinctions include an Eloranta Fellowship, a Mili Foundation grant, a Sigma Xi grant, an award (the highest ever) from the MIT Council for the Arts, and election to Sigma Pi Sigma

- Received support from Polaroid founder Edwin Land, strobe photography inventor Harold Edgerton, father of information theory Claude Shannon, and others to produce a documentary on the history of robotics
- Authored a thesis on fluid mechanical phenomena, which included *Fluidmagic*, a highly popular lecture-demonstration and educational video

School of the Art Institute of Chicago, Chicago, IL

- Undergraduate coursework in media technology, 1979-1980
- Studied holography, video and audio signal processing, computer graphics programming, etc.

Vanier College, Montreal, PQ, Canada

- Diplome d'Etudes Collegiales in studio art, 1978

PATENTS AND PUBLICATIONS

- Nearly 70 issued U.S. patents in the fields of 3-D printing, MEMS, and medical devices, with many pending; 1st or sole inventor on many of these.
- Saari et al., "Fiber Encapsulation Additive Manufacturing: An Enabling Technology for 3D Printing of Electromechanical Devices and Robotic Components", 3D Printing and Additive Manufacturing, Vol. 2, No. 1, 2015.
- Saari et al., "Multi-Material Additive Manufacturing of Robot Components with Integrated Sensor Arrays", *SPIE Sensors for Next-Generation Robotics II, Proceedings of SPIE*, Baltimore, MD, April 2015.
- Vasilyev et al., "Percutaneous Steerable Robotic Tool Delivery Platform and Metal MEMS Device for Tissue Manipulation and Approximation: Initial Experience with Closure of Patent Foramen Ovale", Circulation: Cardiovascular Interventions, July 30, 2013, pp. 468-475.
- Dupont et al., "Concentric Tube Robots for Minimally Invasive Surgery", *Hamlyn Symposium on Medical robotics*, pp. 3-4, 2012.
- Cohen, "High-Volume Additive Manufacturing of Highly-Miniaturized Metal Devices", IMAPS Advanced Technology Workshop on 3D and Conformable Printed Electronics, El Paso, TX, February 22, 2012.
- Gosline et al., "Percutaneous Intracardiac Beating-heart Surgery using Metal MEMS Tissue Approximation Tools", International Journal of Robotics Research 31(9), pp. 1081-1093 (2012).
- Butler et al., "Metal MEMS Tools for Beating-heart Tissue Approximation", 2011 IEEE International Conference on Robotics and Automation (ICRA), May 9-13, 2011, Shanghai, China. (Finalist for Best Medical Robotics Paper).
- Vasilyev et al., "Image-Guided Beating-Heart Closure of Patent Foramen Ovale Using Novel MEMS Closure Device", TCT (Transcatheter Cardiovascular Therapeutics) 2010, Sept. 21-25, Washington
- Cohen et al., "Volume Manufacturing of Functional 3-D Metal Micro-Mechanisms", ICOMM/4M 2010, Madison, Apr. 5-8, 2010
- Cohen et al., "Fabricating a Micro-Scale, Multi-Component Instrument for Minimally-Invasive Surgery", Commercial Micro Manufacturing, Volume 3, Issue 1, pp. 52-56

- Cohen et al., “Microscale metal additive manufacturing of multi-component medical devices”, Rapid Prototyping Journal, 16(3) (2010) (invited journal paper)
- Cohen et al., “Wafer-Scale, Solid Freeform Fabrication of Fully-Assembled Metal Micro-Mechanisms for Minimally-Invasive Medical Devices”, *Solid Freeform Fabrication Symposium 2009, Proceedings*, UT Austin; awarded a “SFF Symposium Outstanding Paper” distinction
- Cohen, A. A Wafer-Based, 3-D Metal Micro-Manufacturing Technology for Ultraminiaturized Medical Devices”, IEEE Engineering in Medicine and Biology Society, October 2008 (invited oral presentation).
- Chen et al., “Microfabricated tissue removal instruments for minimally-invasive procedures”, 19th International Conference of the Society for Medical Innovation and Technology, Japan, Nov. 2007
- Cohen et al., “Batch Fabrication of Complex, Pre-Assembled, Miniature Medical Devices”, *Proceedings of ASM Materials and Processes for Medical Devices*, Palm Desert, Sept. 23-25, 2007
- Kruglick, Cohen, and Bang, “EFAB Technology and Applications”, *The MEMS Handbook*, Second Edition, CRC Press, Taylor & Francis Group, 2006
- Cohen and Wooden, “Monolithic 3-D Microfabrication of Mechanisms With Multiple Independently-Moving Parts”, *Proceedings of IMECE2005:2005 ASME International Mechanical Engineering Congress and Exposition*, Nov. 2005, Orlando
- Brown et al., “Characteristics of Microfabricated Rectangular Coax in the Ka Band”, Microwave and Optical Technology Letters, Vol. 40, No. 5, March 5, 2004.
- *The MEMS Handbook*, CRC Press, 2000 (co-author)
- Cohen, “3-D Micromachining by Electrochemical Fabrication”, Micromachine Devices, Mar. 1999
- Cohen et al., “EFAB: Low-Cost, Automated Electrochemical Batch Fabrication of Arbitrary 3-D Microstructures”, Micromachining and Microfabrication Process Technology session of SPIE’s 1999 Symposium on Micromachining and Microfabrication
- Cohen et al., “EFAB: Rapid, Low-Cost Desktop Micromachining of High Aspect Ratio True 3-D MEMS”, *12th IEEE International Microelectromechanical Systems Conference, 1999, Technical Digest*, IEEE
- Cohen et al, “EFAB: Batch Production of Functional, Fully-Dense Metal parts with Micron-Scale Features”, *Solid Freeform Fabrication Symposium 1998, Proceedings*, UT Austin
- Rapid Prototyping Report--The Newsletter of the Desktop Manufacturing Industry, (June 1991-October 1992), and The Rapid Prototyping Directory, CAD/CAM Publishing, Inc.
- *Rapid Prototyping and Manufacturing*, Society of Manufacturing Engineers, 1992 (co-author)
- Cohen, “Anti-Pinhole Imaging”, Optical Acta, vol. 29, no. 1 (1982)

PROFESSIONAL MEMBERSHIPS

- ASME
- IEEE, including the Robotics and Automation Society

PERSONAL

- U.S. citizen
- Hobbies: Cycling, playing and composing music
- High level of proficiency in French, some knowledge of German

REFERENCES

- Available on request
- Recommendations and profile at <http://www.linkedin.com/in/adamcohen10>