MICHAEL J. CIMA

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EDUCATION:

B.S. Chemistry (1982) / Ph.D. Chemical Engineering (1986), University of California at Berkeley

POSITIONS

Professor with tenure, Department of Materials Science and Engineering, Massachusetts Institute of Technology, Investigator at the Koch Institute for Integrative Cancer Research, Associate Dean for Innovation, School of Engineering, Massachusetts Institute of Technology, Director, Convergence Products Research Laboratory, Faculty Director of the Lemelson-MIT Program, Co-Director of the MIT Innovation Initiative

PROFESSIONAL AFFILIATIONS:

American Chemical Society, Materials Research Society, American Ceramic Society, Ceramic Society of Japan

HONORS:

Awarded the Robery D. Pehlke Lectureship in Materials Processing from the University of Michigan 2024, Elected a Fellow of the American Institute for Medical and Biological Engineering (AIMBE) 2024, W. David Kingery Award 2019, Appointed Associate Dean of Innovation, MIT School of Engineering, 2018, Elected to the National Academy of Inventors 2016, Elected to the National Academy of Engineering 2011, David H. Koch Professor of Engineering 2011, Fulrath Award 2003, Winner of the International Award of Materials Engineering for Resources, 1998, Sumitomo Electric Industries Chair, 1997, Fellow of the American Ceramics Society, 1997, R&D 100 Award for 3DP Applied to Metal Casting, 1994, ALCOA Foundation Science Award, 1991, Extractive Metallurgy Award, TMS, best paper, 1990, Norton Chair, 1989, Phi Beta Kappa, UC Berkeley, 1982

EXTERNAL APPOINTMENTS

Co-Founder, TARIS Biomedical; a developer of pharmaceutical products for urology.

Co-Founder, T2 Biosystems; developer of point-of-care diagnostic systems.

Co-Founder Micro Chips Biotech, developer microelectronic based drug delivery and diagnostic systems now Known as Dare Biosciences.

Co-Founder; Stratagen Bio; radiological diagnostic company

Director; GelMEDIX, Inc., cell therapeutics company

BIOSKETCH / RESEARCH OVERVIEW:

Dr. Michael J. Cima is a Professor of Materials Science and Engineering at the Massachusetts Institute of Technology and has an appointment at the David H. Koch Institute for Integrative Cancer Research. He earned a B.S. in chemistry in 1982 (Phi Beta Kappa) and a Ph.D. in chemical engineering in 1986, both from the University of California at Berkeley. Prof. Cima joined the MIT faculty in 1986 as an Assistant Professor. He was promoted to full Professor in 1995. He was elected a Fellow of the American Ceramics Society in 1997. Prof. Cima was elected to the National Academy of Engineering in 2011 and to the National Academy of Inventors in 2016. He now holds the David H. Koch Chair of Engineering at MIT. He was appointed faculty director of the Lemelson-MIT Program in 2009 which is a program to inspire youth to be inventive and has a nationwide reach.

Prof. Cima is author or co-author of over Three hundred peer reviewed scientific publications, fifty US patents, and is a recognized expert in the field of medical devices and materials processing. Prof. Cima is actively involved in materials and engineered systems for improvement in human health such as treatments for cancer, metabolic diseases, trauma, and urological disorders. Prof. Cima's research concerns advanced forming technology such as for complex macro and micro devices, colloid science, MEMS and other micro components for medical devices that are used for drug delivery and diagnostics, high-throughput development methods for formulations of materials and pharmaceutical formulations. He is also known for his innovative use of MRI and magnetic relaxation methods for assessment of patient volume status.

He is a coinventor of MIT's three-dimensional printing process. Machines and products by many licensees using this process are used throughout the world. His research has led to the development of chemically derived epitaxial oxide films for HTSC coated conductors. He and collaborators are developing implantable MEMS devices for unprecedented control in the delivery of pharmaceuticals and implantable diagnostic systems. Finally, through his consulting work he has been a major contributor to the development of high throughput systems for discovery of novel crystal forms and formulations of pharmaceuticals. Prof. Cima also has extensive entrepreneurial experience. He is co-founder of MicroChips Biotech., a developer of microelectronic based drug delivery and diagnostic systems. Prof. Cima took two sabbaticals to act as senior consultant and management team member at Transform Pharmaceuticals Inc. a company that he helped start and that was ultimately acquired by Johnson and Johnson Corporation. He is a co-founder of T2 Biosystems a medical diagnostics company that uses magnetic relaxation in highly sensitive molecular assays. Prof. Cima is also a co-founder of Taris Biomedical a company specializing in pharmaceutical products for urology.

Prof. Cima is devoted to engineering education and was the instructor in charge of 3.091 (Introduction to solid-state chemistry) from 2011 through 2014 which is a unique MIT course. This course has satisfied the freshman chemistry requirement at MIT for over forty years. It is the first engineering course that MIT students will encounter and has over 300 students. It has been offered many times since 2012 as 3.091x to students world-wide over the edX platform. Many tens of thousands of students have participated.

Prof. Cima has been faculty director of the MIT Glass Lab for the past twenty-seven years. He arrived at MIT when it was known for producing students with spectacular individual achievement, but poor teamwork skills. MIT was in the midst of trying to address this issue when he had the idea of using an extracurricular activity to build teamwork skills. He happened on an

old studio glass blowing facility in the basement at the center of campus and several students interested in rebuilding it. Studio glass blowing is the only craft art that you cannot do by yourself. It is done as a team. Today the Glass Lab is the most oversubscribed class at MIT with classes composed of students from all departments at MIT. It is a great way for students to learn how to improvise together to solve problems and have fun doing it.

PUBLICATIONS

1. Cima, M. J. and Rhine, W. E., **Powder Processing for Microstructural Control in Ceramic Superconductors**, *Advanced Ceramic Materials*, 2, 329-36, (1987).
2. Cima, M. & Brewer, L., **The generalized lewis acid-base titration of palladium and niobium.** *Metallurgical Transactions B* **19**, 893-917 (1988).
3. Cima, M. J., Schneider, J. S., Peterson, S. C. & Coblenz, W., **Reaction of $Ba_2YCu_3O_{6.9}$ films with yttria-stabilized zirconia substrates.** *Applied Physics Letters* **53**, 710-712 (1988).
4. Peterson, S. C. & Cima, M. J., **Magnetic inducement of texture in Ba2YCu3O6.9 particle assemblies under cryogenic conditions.** *Journal of the American Ceramic Society* **71**, 458-459 (1988).
5. Cima, M. J. and Lewis, J. A., **Firing-Atmosphere Effects on Char Content from Alumina-Poly (Vinyl Butyral) Films**, *Ceramic Transactions*, 1, 567-74, (1988).
6. Cima, M. J., Chiu, R., and Rhine, W. E., **Barium Yttrium Copper Oxide ($Ba_2YCu_3O_{6.9}$) Powder Preparation by Sol-Gel Emulsion Techniques**, *Materials Research Society Symposium Proceedings*, 99, 241-4, (1988).
7. Brody, H. D., Haggerty, J. S., Cima, M. J., Flemings, M. C., Barns, R. L., Gyorgy, E. M., Johnson, D. W., Rhodes, W. W., Sunder, W. A. & Laudise, R. A., **Highly textured and single crystal $Bi_2CaSr_2Cu_2O_x$ prepared by laser heated float zone crystallization.** *Journal of Crystal Growth* **96**, 225-233 (1989).
8. Cima, M. J., Dudziak, M. & Lewis, J. A., **Observation of poly (vinyl butyral)-dibutyl phthalate binder capillary migration**. *Journal of the American Ceramic Society* **72**, 1087-1090 (1989).
9. Holm, E. A. & Cima, M. J., **Two-dimensional whisker percolation in ceramic matrix-ceramic whisker composites.** *Journal of the American Ceramic Society* **72**, 303-305 (1989).
10. Kim, M. G., Cima, M. J. & Searcy, A. W., **Comparison of sizes of magnesia crystals calculated from X-ray diffraction line-broadening and transmission electron microscopy observations.** *Journal of the American Ceramic Society* **72**, 1514-1516 (1989).
11. Cima, M. J., **Advanced Chemical Processing of Ceramic Materials**, *MRS International Meeting on Advanced Materials*, 3, 47-54, (1989).
12. Cima, M. J., Lewis, J. A., and Devoe, A. D., **Binder Distribution in Ceramic Greenware During Thermolysis**, *Journal of the American Ceramic Society*, 72, 1192-9, (1989).
13. Holm, E. A. and Cima, M. J., **Zero-Shrinkage Whisker Fraction in Ceramic Matrix-Ceramic Whisker Composites**, *Materials Research Society Symposium Proceedings*, 155, 319-30, (1989).

14. Calvert, P. & Cima, M., **Theoretical models for binder burnout.** *Journal of the American Ceramic Society* **73**, 575-579 (1990).

15. Cima, M. J., Jiang, X. P., Chow, H. M., Haggerty, J. S., Flemings, M. C., Brody, H. D., Laudise, R. A. & Johnson, D. W., **Influence of growth parameters on the microstructure of directionally solidified $Bi_2Sr_2CaCu_2O_y$.** *Journal of Materials Research* **5**, 1834-1849 (1990).

16. Kelly, J. R., Giordano, R., Pober, R. & Cima, M. J., **Fracture surface analysis of dental ceramics: clinically failed restorations.** *The International journal of prosthodontics* **3**, 430-440 (1990).

17. McIntyre, P. C., Cima, M. J. & Ng, M. F., **Metalorganic deposition of high-Jc $Ba_2YCu_3O_{7-x}$ thin films from trifluoroacetate precursors onto (100) $SrTiO_3$**. *Journal of Applied Physics* **68**, 4183-4187 (1990).

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20. Sachs, E., Cima, M. & Cornie, J., **Three-Dimensional Printing: Rapid Tooling and Prototypes Directly from a CAD Model.** *CIRP Annals - Manufacturing Technology* **39**, 201-204 (1990).

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22. Beylier, E., Pober, R. L., and Cima, M. J., **Centrifugal Casting of Ceramic Components**, *Ceramic Transactions*, 12, 529-36, (1990).

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29. Ng, M. F., Peterson, S. C., and Cima, M. J., **Recrystallization of Non-Vacuum Derived Barium Yttrium Copper Oxide ($Ba_2YCu_3O_{7-\alpha}$) Films**, *Materials Research Society Symposium Proceedings*, 169, 731-4, (1990).

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36. Nashimoto, K. & Cima, M. J., **Epitaxial $LiNbO_3$ thin films prepared by a sol-gel process.** *Materials Letters* **10**, 348-354 (1991).

37. Sachs, E., Cima, M. & Bredt, J., **Three-dimensional printing of ceramic shells and cores for metal casting**, in *American Society of Mechanical Engineers, Production Engineering Division (Publication) PED*, 1991, 61-72 (1991).

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44. Cima, M. J., Flemings, M. C., Figueredo, A. M., Nakade, M., Ishii, H., Brody, H. D. & Haggerty, J. S., **Semisolid solidification of high temperature superconducting oxides.** *Journal of Applied Physics* **72**, 179-190 (1992).

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50. Tang, Y. and Cima, M. J., **Deformation During Binder Removal from Multilayer** Ceramic Greenware, *Ceramic Transactions*, 26, 115-24, (1992).

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61. McIntyre, P. C. & Cima, M. J., **Microstructural evolution during epitaxial growth of chemically derived $Ba_2YCu_3O_{7-x}$ thin films**, in *Materials Research Society Symposium Proceedings*, 1993, 371-374 (1993).

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293. Bhagavatula SK, Upadhyaya K, Miller BJ, Bursch P, Lammers A, Cima MJ, Silverman SG, Jonas O. **"An interventional image-guided microdevice implantation and retrieval method for in-vivo drug response assessment."** *Med Phys.* 2019 Nov; 46(11):5134-5143. doi: 10.1002/mp.13803. Epub 2019 Sep 26. PMID:31494942

294. Lee CS; Cheah JH; Soule CK; Din H; Whittaker CA; Karhohs K; Burds AA, Subramanyam KS; Carpenter AE.; Eisner BH; Cima MJ "**Identification and local delivery of vasodilators for the reduction of ureteral contractions"** *Nature Biomedical Engineering* 2020 Jan 4, doi: 10.1038 s41551-019-0482-4 ISSN: 2157-846X Epub 2019 Dec. 02. PMID: 31792422

295. Ramadi KB, Bashyam A, Frangieh CJ, Rousseau EB, Cotler MJ, Langer R, Graybiel AM, Cima, MJ "**Computationally Guided Intracerebral Drug Delivery via Chronically Implanted Microdevices"** *Cell Rep,* 2020 June 9;31(10):107734. doi: 10.1016/j.celrep.2020.107734.PMID: 32521259

296. Ramadi KB, Dagdeviren C, Bhagchandani P, Nunez-Lopez C, Kim MJ, Langer R, Graybiel AM, Cima, MJ **"Simultaneous recording and marking of brain microstructures"** *J Neural Eng* 2020 Jul 24;17(4):044001. doi: 10.1088/1741-2552/aba161.PMID: 32604074

297. Raman R, Rousseau EB, Wade M, Tong A, Cotler MJ, Kuang J, Lugo AA, Zhang E, Graybiel AM, White FM, Langer R, Cima MJ **"Platform for micro-invasive membrane-free biochemical sampling of brain interstitial fluid"** *Sci Adv*. 2020 Sep 25;6(39): eabb0657. doi: 10.1126/sciadv. abb0657. Print 2020 Sep.PMID: 32978160

298. Bashyam A, Frangieh CJ, Raigani S, Sogo J, Bronson K, Yeh H, Ausiello D, Cima MJ **"A portable single-sided magnetic-resonance sensor for the grading of liver steatosis and fibrosis"** *Nat Biomed Eng. 2021 Mar;5(3):240-251. doi: 10.1038/s41551-020-00638-0. Epub 2020 Nov 30. PMID: 33257853*

299. Schwerdt H, Amemori K, Gibson DJ, Stanwicks LL, Yoshida T, Bichot NP, Amemori S, Desimone R, Langer R, Cima MJ, Graybiel AM "**Dopamine and beta-band oscillations differentially link to striatal value and motor control"** *Science Advances* 2020 Sept 25; 6(39): eabb9226. Doi: 10.1126/sciadv. abb9226

300. Cotler MJ, Ramadi KI, Hou X, Christodoulopoulos E, Ahn S, Bashyam a, Ding H, Larson M, Oberg AL, Whittaker C, Jonas O, Kaufmann SH, Weroha SJ, Cima MJ **"Machine-Learning aided in situ drug sensitivity screening predicts treatment outcomes in ovarian PDX tumors"** *Translational Oncology 2022 Jul;21:101427. doi: 10.1016/j.tranon.2022.101427. Epub 2022 Apr 26. PMID: 35472731*

301. Rousseau, Erin, Ritu Raman, Tigist Tamir, Angel Bu, Shriya Srinivasan, Naomi Lynch, Robert Langer, Forest M. White, and Michael J. Cima. "**Actuated tissue engineered muscle grafts restore functional mobility after volumetric muscle loss**." Biomaterials 302 (2023): 122317.

302. Schwerdt, Helen, Ann M. Graybiel, and Michael J. Cima. "**In Vitro FSCV Testing of Carbon Fiber Electrodes to Characterize Functional Operation in Dopamine Detection**." (2023). https://slack.protocols.io:8443/view/in-vitro-fscv-testing-of-carbon-fiber-electrodes-t-cskawcse.html

303. Schwerdt, Helen, Michael J. Cima, and Ann M. Graybiel. "**Characterization of Splay Characteristics of Carbon Fiber Electrode Threads (CFETs) in Agar Brain Phantom**." (2023). https://www.protocols.io/view/characterization-of-splay-characteristics-of-carbo-cspkwdkw.html

304. Schwerdt, Helen, Michael J. Cima, and Ann M. Graybiel. "**In Vivo Carbon Fiber Electrode Thread (CFET) Implantation and Testing Procedures**." (2023). https://slack.protocols.io:8443/view/in-vitro-fscv-testing-of-carbon-fiber-electrodes-t-cskawcse.html

305. 6. Mingyi Xia, Busra Nur Agca, Tomoko Yoshida, Jiwon Choi, Usamma Amjad, Kade Bose, Nikol Keren, Shahar Zukerman, Michael J Cima, Ann M Graybiel, Helen N Schwerdt, "**Scalable, flexible carbon fiber electrode thread arrays for three-dimensional probing of neurochemical activity in deep brain structures of rodents**." Biosensors and Bioelectronics 241 (2023): 115625.

306. Sherman, Sydney E., Alexa S. Zammit, Won-Seok Heo, Matthew S. Rosen, and Michael J. Cima. "**Single-sided magnetic resonance-based sensor for point-of-care evaluation of muscle.**" Nature Communications 15, no. 1 (2024): 440.

ABSTRACTS

1. Rigby, K., Cima, M. J., Flemings, M. C., Haggerty, J. S., Honjo, S., Shen, H., and Sung, T. H., Directional Solidification of Peritectically Melting BYCO Superconducting Materials, Program and Extended Abstracts - International Workshop on Superconductivity, Controlled Processing of High-Temperature Superconductors: Fundamentals and Applications, Kihei, Hawaii, June 18-21, 1995, 55-58, (1995).
2. Powers, M. J., Kim, S. S., Utsunomiya, H., Sundback, C. A., Benevenuto, M., Wu, B. M., Cima, M. J., Vacanti, J. P., and Griffith, L. G., Adhesion Phenomena in the Organization and Morphogenesis of Liver Cells, Book of Abstracts, 213th ACS National Meeting, San Francisco, April 13-17, COLL-335, (1997).
3. Wu, B. M., Palazzolo, R. D., Rowe, C. W., and Cima, M. J., Drop-on Demand Deposition of Drugs, Book of Abstracts, 213th ACS National Meeting, San Francisco, April 13-17, BIOC-005, (1997).
4. Santini, J. T., Jr., Cima, M. J., and Langer, R. S., Microchips for Drug Delivery, Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000, MEDI-174, (2000).
5. Li, Y., Shawgo, R. S., Tyler, B., Henderson, P. T., Vogel, J. S., Langer, R. S., Brem, H., and Cima, M. J., 14c-Labeled Bcnu Release Kinetics from a Drug Delivery MEMS Device, Abstracts of Papers, 228th ACS National Meeting, Philadelphia, PA, United States, August 22-26, 2004, TOXI-003, (2004).
6. Hong, Rui; Cima, Michael J.; Weissleder, Ralph; Josephson, Lee, Magnetic resonance sensing applications of enhanced sensitivity from Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007 (2007), COLL-360.
7. Hong, Rui; Cima, Michael J.; Weissleder, Ralph; Josephson, Lee, Magnetic field induced particle clustering and its application in viscosity measurement, Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007 (2007), COLL-174.

8. Taktak, Sonia; Sosnovik, David; Cima, Michael J.; Weissleder, Ralph; Josephson, Lee, NMR-based sensors using iron oxide nanoparticles, Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007 (2007), INOR-491.

Invited Lectures

Sept. 1989 "Microstructural Development in Chemically and Particulate Ba_2YCu_3Oy Films," DARPA contractor meeting Santa Barbara CA.

Nov. 1989 "Directional Solidification of High-Temperature Superconductors," AICHE Topical Conference on Emerging Technologies in Materials San Francisco CA.

Dec. 1989 "Liquids and Processing of High Temperature Superconductors," National Chemical Laboratory for Industry Tsukuba Japan.

Dec. 1989 "Liquids and Processing of High Temperature Superconductors," University of Tokyo, Tokyo Japan.

Feb. 1990 "Centrifugal Casting of Ceramic Components," Third International Conference on Powder Processing Science San Diego CA.

March 1990 "Percolation Phenomena in Ceramic Processing," Sixth Annual Symposium on Advanced Ceramics American Ceramic Society, Hudson-Mohawk Section Troy N.Y.

March 1990 "Chemical Issues in Contemporary Ceramics Processing," SUNY Binghamton NY.

April 1990 "Whisker Percolation in Ceramic Matrix Composites," Annual Meeting of the American Ceramics Society Dallas TX.

April 1990 "Three-Dimensional Printing: Forming of Ceramic Structures for Casting," Annual Meeting of the American Ceramics Society Dallas TX.

April 1990 "The Removal of Processing Aids," Annual Meeting of the American Ceramics Society Dallas TX.

July 1990 "Particulate Ceramic Processing," Gordon Conference on High Temperature Chemistry Kimball Union Academy Meriden NH.

Sept. 1990 "Processing of Particulate Ceramics," Barnett F. Dodge Lecturer Department of Chemical Engineering Yale University New Haven CT.

Nov. 1990 "The Removal of Processing Aids from Ceramic Greenware," Annual Meeting of the American Institute of Chemical Engineers Chicago IL.

Nov. 1990 "Centrifugal Casting of Ceramic Components," Annual Meeting of the American Institute of Chemical Engineers Chicago IL.

Jan. 1991 "Metalorganic Deposition of High-J_c $Ba_2YCu_3O_{7-x}$ Thin Films on Single Crystal Substrates"; XII Winter Meeting on Low Temperature Physics Valle de Cuernavaca Morelos Mexico.

March 1991 "Drying Behavior of Ceramic Granular Films," 4th International Conference on Ceramic Powder Processing Science Nagoya Japan.

May 1991 "Directional Solidification of HTSC Oxides" The Third ISTEC Workshop on Superconductivity "New Superconductors and Syntheses," Kumamoto Japan.

Oct. 1991 "Semisolid Solidification of $Ba_2YCu_3O_{6+y}$ Fibers," 4th International Symposium on Superconductivity Tokyo Japan.

Nov. 1991 "Enabling Process Technologies for Ceramics," International Journal of the Society of Materials Engineering for Resources Vol. 1 No. 1 pp. 3-9 (1993) Akita City Japan.

Dec. 1991 "Drying of Granular Ceramic Films," Materials Research Society Boston MA.

Feb. 1992 "Ceramics Processing: Structure Form and Performance," Florida Advanced Materials Chemistry Conference Palm Coast FL.

April 1992 "$Ba_2YCu_3O_{6.5}$ Solidification Kinetics from Semisolid Melts," Workshop on "Bulk Processing and Critical Current Density of High-T_c Superconductors," Argonne National Laboratory Argonne IL.

June 1992 "Ceramics Processing in the 1990's" A.R. Cooper Distinguished Speaker Award at the 19th Annual Symposium of the Northern Ohio Section of the American Ceramic Society Cleveland OH.

July 1992 "Construction of Computer-Derived Microstructures from 3D Printing," Solid Freeform Fabrication Symposium Austin TX.

Nov. 1992 "Enabling Technologies in Ceramics Processing," Departmental Colloquium Speaker Department of Materials Science and Engineering University of Illinois at Urbana-Champaign Urbana IL.

Nov. 1992 "Morphology of BaY_2CuO_5 and Semisolid Solidification of $Ba_2YCu_3O_{6.5}$," Fall Meeting of the TMS Society Chicago IL

Jan. 1993 "Challenges in Solid Free Form Fabrication," ONR Manufacturing Science Workshop Chantilly VA.

Feb. 1993 "Ceramics Process Technologies for Micro and Macro Control," Departmental seminar Department of Materials Science and Engineering University of Connecticut.

Sep. 1993 "3D Printing: Computer-Derived Shapes and Structures," Raytheon Lexington MA

July 1993 "Inhomogeneity and Anisotropy of Tape Cast Ceramic Films used for Multilayer Ceramic Structures," Workshop on Ceramics Science and Technology Ankara Turkey

Oct. 1993 "Critical Current Enhancement of Directionally Solidified HTSC Materials: Microstructural Control," Engineering Research Symposium Tokyo Electric Power Corp. Tokyo Japan.

Nov. 1993 "Drying and Binder Removal from Ceramic Components," AIChE Annual Meeting St. Louis MI.

Jan. 1994 "Low-Cost High-Performance Tooling by 3D Printing Ceramic Injection Molds from Computer Files," 18th Annual Conference and Exposition on Composites Materials and Structures Cocoa Beach FL.

Jan. 1994 "Enabling Technologies and Science for Powder Processing: Structure Form and Performance" Departmental seminar Department of Ceramic Engineering Rutgers University Piscataway NJ

Apr. 1994 "Creation of order in Nanocrystalline Solids by Ion beam assisted deposition" Workshop on Nanoparticle Processing University of Illinois at Urbana-Champaign Urbana IL

Apr. 1994 "Density and Anisotropy of Tape-Cast Ceramic Green Sheets," Synthesis Processing and Microstructure Symposium at the 96th ACerS Annual Meeting Indianapolis IN.

Sept. 1994 "Advances in Ceramics Forming," International Conference on Ceramics Processing Science and Technology Friedrichshafen Fed. Rep. of Germany

Oct. 1994 "Ceramics Manufacturing; from Science to Practice," Second International Conference on Materials Engineering for Resources Akita Japan.

Feb. 1995 "Advanced Materials Technology: University to Commercial Practice," International Workshop on Regional Science and Technology Policy Research in Himeji (RESTPOR '95) Japan.

March 1995 "Microstructural Order and Materials Processing for Structure and Form," University of Michigan Arbor MI.

April 1995 "Ceramic Components from Solid Free Form Fabrication Methods," International Conference on Shaping of Advanced Ceramics Mol Belgium.

May 1995 "Chemical Aspects of Ceramic Science," Zuffanti Memorial Lecture Northeastern University Boston MA.

July 1995 "Solid Free Form Fabrication of Ceramics." Science of Whitewares Conference Alfred University Alfred NY.

July 1995 "Defense Science Research Council's Workshop on "Printing Technologies in Manufacturing - I&II La Jolla CA.

March 1996 "Solution Precursor Routes to Epitaxial Films," International Symposium on Synergistic Synthesis of Inorganic Materials Tangernsee Germany.

April 1996 "Setter Design for Binder Removal from Injection Molded Components," American Society Annual Meeting in Indianapolis Ind.

April 1996 "Corrosion of Aluminum Nitride in Aqueous Cleaning Solutions," Materials Research Society Spring Meeting San Francisco CA.

May 1996 "Structural Materials by 3DP," Review of ARPA/ONR Solid Freeform Program Woods Hole MA.

June 1996 "Materials Engineering: Concepts Prototypes Processes." Science and Engineering Program for Middle and High School Teachers MIT, Cambridge MA.

Aug. 1996 "Structural Ceramic Components with Computer Derived Microstructure by Three-Dimensional Printing," Solid Freeform Fabrication Symposium University of Texas at Austin, Austin TX.

Oct. 1996 "Microstructure Order and Materials Processing for Structure and Form," Fall Quarter Seminar University of Minnesota Minneapolis MN.

Oct. 1996 "Solid Freeform Fabrication of Functionally Gradient Materials," The 4th International Symposium on Functionally Gradient Materials Tsukuba Japan.

Nov. 1996 "Processing Technologies for Hierarchical Structures in Ceramics," Workshop on Synergy Ceramics Nagoya Japan.

Dec. 1996 "Rapid Prototyping and 3D Printing," American Ceramics Society and The Materials Society Chelmsford MA.

Feb. 1997 D.O.E. Wire Development Workshop Panama City Florida.

March 1997 "Crystallographic Texture in Films Using Ion Beams," The American Physical Society Kansas City MO.

April 1997 "Advanced Ceramics Processing: Structure Form and Performance," University of California at Davis, Davis CA.

April 1997 "Microstructure Order and Materials Processing for Structure and Form," Korea Advanced Institute of Technology Taejon Korea.

May 1997 "Three-Dimensional Printing Applications and New Materials Developments," ACerS 99th Annual Meeting & Exposition Cincinnati OH.

June 1997 "Forming and Bulk Fabrication of Ceramic Components," NSF Ceramics Workshop Washington, D.C.

July 1997 "The Mechanics of Biaxial Alignment in Zirconia Films Produced via Ion Beam Assisted Deposition (IBAD)," Cryogenic Engineering Conference/International Cryogenic Materials Conference," Portland Oregon.

Aug. 1997 "Toward Zero Shrinkage in Three-Dimensional Printing," "High Green Density Ceramic Components," and "3-Dimensional Printing Applications and New Materials Development," Solid Freeform Fabrication Symposium University of Texas at Austin, Austin TX.

Nov. 1997 "Advanced Materials: Concepts Prototypes and Manufacturing," University of Wisconsin-Madison Madison WI.

Feb. 1998 DARPA Thermal Management of Compact Systems Washington, D.C. February 5-6, 1998.

March 1998 National Materials Advisory Board (NMAB) Workshop on Structural Materials Research Advancements Washington, D.C. March 16-17, 1998.

March 1998 International Symposium on Aluminum Nitride Ceramics, le Meridien Pacific Tokyo, March 8-14, 1998 Tokyo Japan

May 1998 "Anisotropic Behavior of Tape Cast Ceramic Sheets," 100th Annual Mtg. American Ceramic Society Cincinnati OH. May 3-6, 1998.

June 1998 "Fine Ceramic Components by 3DP," ONR Workshop Abingdon, UK. June 22-24, 1998

June 1998 "High Green Density Ceramic Components Fabricated by the Slurry-Based 3DP Process," 9th CIMTEC '98 World Ceramics Congress and Forum on New Materials Florence Italy. June 14-19, 1998.

July 1998 "The Mechanism of Biaxial Alignment in Zirconia Films Produced via Ion Beam Assisted Deposition (IBAD) ISTEC International Workshop on Superconductivity Okinawa, Japan. July 12-15, 1998.

Aug. 1998 "Solid Free-Form Processing of Tailored Ceramic Microstructures," Ceramics Gordon Research Conference Meriden, NH. August 2-6, 1998.

Aug. 1998 "Fine Ceramic Components by 3DP," 9th Solid Free-Form Fabrication Symposium," Austin TX. August 10-12, 1998.

Sept. 1998 "Corrosion of Aluminum Nitride (AlN) in Aqueous Cleaning Solutions and New Processing Approaches to Metallization," Case Western Reserve Cleveland OH. September 22, 1998.

Oct. 1998 "SFF Processing of Tailored Ceramic Microstructures." International Conference on Materials Engineering for Rources ICMR '98, Akita, Japan, October 26-28, 1998.

June 1999 "3-D Architecture: Photolayering Technology." Manufacturing Committee Technical Symposium, Short Hills, New Jersey, June 13-16, 1999.

June 1999 "Electrochemically-Actuated Microdosage Platforms." The Microfluidics and Microarrays Conference, La Jolla, CA, June 20-22, 1999.

Aug. 1999 "Electrochemically-actuated microdosage platform." IBC's 4th Annual Microfabrication & Microfluidic Technologies Conference, San Francisco, CA, August 2-3, 1999.

Nov. 1999 "Slurry-based 3-Dimensional Printing Process for Fine Ceramic Applications." AIChE 1999 Annual Meeting, Dallas, TX, Oct. 31-Nov. 5, 1999.

Nov. 1999 "Rapid Phototyping." META-Materials Workshop, Arlington, Virginia, November 9-10, 1999.

Dec. 1999 University of New Hampshire, Durham, NH. December 10, 1999.

Jan. 2000 "Solid Free Form Fabrication: Fine Ceramic Components to Pharmaceuticals."" Schlumberger-Doll Research, Ridgefield, CT, January 13, 2000.

March 2000 National Research Council Panel for Materials Science & Engineering, Gaithersburg, Maryland, March 16-17, 2000.

May 2000 "Free-Form Manufacturing of Ceramic Parts." 7th International Conference on Ceramic Processing Science, Inuyama City, Japan, May 15-8, 2000.

Sept 2000 "Microchips as Implantable Drug Delivery Devices." Biomems & Biomedical Nanotechnology World 2000 Conference, Columbus, OH. September 23-26, 2000.

Oct 2000 "Electro-Actuated Devices as Microdosage Platforms and Manufacturing Tools." University of Toronto, Toronto, Ontario, October 25, 2000.

Nov 2000 "Implantable Electronic Drug Delivery Systems." The Medical Application of Microsystems & Tier Manufacture Experts' Meeting, Loch Lomond, Scotland. November 19-21, 2000.

June 2001 Chairperson, 28th International Symposium on Controlled Release of Bioactive Materials, San Diego, CA. June 23-27, 2001.

Aug. 2001 Reviewer, "Superconductivity Program for Electric Systems, 2001 Annual Peer Review." Washington, D.C., August 1-3, 2001.

Sept. 2001 "Global Trends in Science and Technology RoundTable." Washington, D.C., September 25, 2001.

Feb. 2002 "Microelectric Dosage Platforms." 2002 Gordon Conference on Drug Carriers in Medicine and Biology. Ventura, California. February 24 – March 1, 2002.

April 2002 "Materials in Small Places," The 2002 MIT Research Directors Conference, MIT, Cambridge, MA, April 10, 2002.

April 2002 "MEMS for Drug Delivery and Drug Development" George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, April 22, 2002.

July 2002 Reviewer, "DOE 2002 Superconductivity Peer Review, Strategic Research Panel." Washington, D.C., July 17th through 19th, 2002.

Sept. 2002 "Kinetics of *in vivo* Drug Release from Implantable MEMS Array." Third Annual BioMEMs & Biomedical Nanotechnology World 2002 in collaboration with the International Society for BioMEMS and Nanotechnology. Columbus, Ohio on September 5-8, 2002

Oct. 2002 "Drug Release from an Implantable MEMS Array." Future Directions of Drug Delivery Technologies: Molecular Design, Response and Nanotechnology, Boston, MA, October 13-16, 2002.

Dec. 2002 "Electro-actuated devices as microdosage platforms and manufacturing tools." Bristol-Myers Squibb, New Brunswick, NJ, December 6, 2002.

April 2003 "Forces and Particle Dynamics as the Precursor to Microscle Assembly." 105th Annual Meeting & Exposition of the American Ceramic Society, Nashville, TN, April 27-30, 2003.

April 2003 "MEMS Devices for Pharmaceutical Delivery," BioMEMS/Microfluidics Conference, San Diego, CA, April 30-May 2, 2003.

Aug. 2003 "Free-form Fabrication Processes for Functional Ceramic Applications." International Conference on Electroceramics, "ICE-2003". M.I.T., Cambridge, Ma, August 3-7, 2003.

Aug. 2003 "Spreading and infiltration of polymer solution droplets on porous particulate substrates." Particles 2003 Conference on Imaging, Marking and Printing Applications of Particle Technology, Toronto, Canada, August 23-26, 2003.

Sept. 2003 "Ceramic Particle Electrophoresis Near Surfaces in an Aqueous Medium," and "Solid Free Form Fabrication: Past, Present, and Future." Euromaterial 2003, Lausanne, Switzerland, September 1-5, 2003.

Oct. 2003 "Drug Delivery: A New Role for Implantable Electronics," University of Michigan, Ann Arbor, MI, October 3, 2003.

Oct. 2003 "Microactuators for pharmaceuticals manufacturing and drug release systems" AAAP Annual Mtg. & Exposition, Salt Lake City, Utah, October 28, 2003.

Dec. 2003 "Implantable Electronic Drug Delivery," 2003 International Electron Devices Meeting, Washington, D.C., December 9, 2003.

Jan. 2004 "Drug delivery: A new role for implantable electronics," or "Forces and Particle Dynamics as a Precursor to Microscale Assembly." Carnegie Mellon University, Pittsburgh, PA, January 16, 2004.

March 2004 Symposium on Biomaterials, Limoges, March 25-26, 2004.

June 2004 "Drug Delivery: A New Role for Implantable Electronics." Workshop on MEMS (PASI), San Carlos de Bariloche, Argentina, June 2004.

July 2004 DOE Peer Review Meeting, Washington, D.C., July 27-29th.

Aug. 2004 "Polymer Microchip for Biodegradable Drug Delivery." Cambridge Healthtech Institute 5th Annual Nanotechnology and BioMEMS World 2004, Washington, D.C., August 16-17, 2004.

Oct. 2004 "Measurement of HF Partial Pressure During Oxyfluoride Precursor Conversion." ASC 2004 Conference, Jacksonville, FL, October 8, 2004.

April 2006 "F/Ba trajectory-property relationships in MOD-derived YBCO coated conductors" 2006 MRS Spring Meeting, San Francisco, CA, April 17-21, 2006.

June 2006 "Implantable MEMS technology for drug delivery." 2006 MEMS Technology and Biomedical Applications, Gordon Research Conference, Connecticut College, New London, CT, June 25-30, 2006.

Nov. 2006 18th EORTC-NCI-AACR Symposium on "Molecular Targets and Cancer Therapeutics", 7 November - 10 November 2006, Prague, Czech Republic

Nov. 2006 NSF-sponsored one-day workshop on "Wearable and Implantable Devices and Systems for Healthcare Monitoring and Diagnostics." November 13, 2006, at the National Science Foundation in Arlington, Virginia.

Dec. 2006 "Superparamagnetic Particles for Invivo Sensors." First International Workshop on Functional Materials (1stIWOFM), December 6th – 9th, 2006, Halong Bay, Vietnam.

March 2007 "Solid Forms of Pharmaceuticals and Thermodynamic Stability." American Physical Society, March 5-9, 2007 in Denver, Colorado.

May 2007 "Materials Science and Pharmaceutical Formulation." M3 Conference in Iceland, Reykjavík, Iceland, May 20th - 23rd, 2007.

Dec. 2007 NSF Nanoscale Science and Engineering 2007 Grantees Conference. Arlington, VA, December 3-6, 2007.

Sept. 2008 Third Annual NCI Nanotechnology Alliance Investigators Meeting. Chicago, Illinois, September 8-10, 2008.

Nov. 2008 DSRC Biocompatible Electronics Workshop. Arlington, VA. November 5, 2008.

Dec. 2008 "Electronic systems and new pharmaceutical therapies." IEDM 2008 Emerging Technology Session. San Francisco, CA, December 16, 2008.

Jan. 2009 World Economic Forum Annual Meeting 2009. Davos-Klosters, Switzerland, January 28 – February 1, 2009.

Jan. 2009 BioE Seminar Series, Spring 2009 at Duke University. Durham, NC, January 29, 2009.

March 2009 "MEMS Technologies for More Effective Clinical Therapies," 2009 MIT Europe Conference Engineering Innovation: An Interdisciplinary Approach, Vienna, Austria March 25-26, 2009.

March 2009 Harvard University Symposium STEM Program, Cambridge, MA. March 27, 2009.

April 2009 Joel G. Hardman Student-Invited Pharmacology Forum, Vanderbilt University, Nashville, TN, April 15-17, 2009.

April 2009 NCI – Cancer Diagnostic Using Nanotechnology Platforms' AACR, Denver, CO. April 20, 2009.

May 2009 Molecules, Materials, Medicines 2009, Santa Barbara, CA. May 16-20, 2009.

June 2009 MIT-China Global Innovation Summit, Beijing. June 15, 2009.

June 2009 Physical Sciences-Oncology Centers NCI Review Meeting, Bethesda, MD. June 29-July 1, 2009.

Sept 2009 Speaking invitation, Duke University, Pratt School of Engineering Durham, NC. September 17, 2009.

Oct. 2009 "Minimally invasive chemical sensors." Collins Lecturer, Dept. of Radiation Oncology, MGH, Boston, MA, October 13, 2009.

Oct. 2009 TATRC-PLR, Frederick, MD, October 15, 2009.

Oct. 2009 Annual Review of Chemical and Biomolecular Engineering (ARCBE) Editorial Committee meeting, Cambridge, MA, October 17, 2009.

Oct. 2009 MS&T 2009 Meeting, Pittsburgh, PA. October 26-27, 2009.

Oct. 2009 Vertex Pharmaceutical Development Networking Evening Event, Boston, MA, October 28, 2009.

Dec. 2009	Ambassador & Mrs. Philip Lader Renaissance Weekend, Charleston, NC. December 28-31, 2009.
March 2010	"Convergence of drugs, diagnostics, and devices with procedures." University of Iowa Hospitals and Clinics, Iowa City, IA. March 26, 2010.
Sept 2010	Maker Faire and the NSF-sponsored workshop – Innovation, Education & the Maker Movement New York, NY.
Nov. 2010	"Drug, Device, or Procedure?" 2010 JNJ Drug Delivery Symposium, Johnson & Johnson, New Brunswick, NJ, November 11, 2010.
April 2011	Fifth IEEE/NIH 2011 Life Science Systems and Applications Workshop (LiSSA '11), NIH Campus, Bethesda, MD, April 7-8, 2011.
May 2011	Convergence Forum, Chatham Bars Inn, Chatham, MA (Cape Cod), May 19-21st.
June 2011	"Implantable Magnetic Relaxation Sensors for the Detection of Biomarkers," at the Nanoparticle Synthesis and Applications Symposium. Boston, MA, June 13-16, 2011.
July 2011	Epoch Foundation symposium in Taiwan, Thursday, July 28, 2011.
August 2011	EMBC 2011 Conference, August 30 - September 3, 2011 at the Boston Marriott Copley Place in Boston, MA.
Nov 2011	"Implanted Diagnostic Devices" MRS Fall Meeting, November 28, 2011, Hynes Convention Center, Boston, MA
Dec 2011	"Convergence of drugs, diagnostics, devices and procedures" French American Innovation Day, Joseph B. Martin Conference Center at Harvard Medical School, December 6, 2011, Boston, MA
Feb 2012	"Convergence of drugs, diagnostics, devices and procedures" Ipsen Pharma, February 6, 2012, Milford, MA.
March 2012	"Electrochemical dosing systems" Injectable Drug Delivery Conference, London, England, March 21 & 22, 2012.
April 2012	Moscow Medical Technology Innovation Summit, Open University Skolkovo, Skolkovo Foundation, Russia, April 1-3, 2012.
April 2012	Dept. of Chemical Engineering at the University of Washington, Seattle, WA, April 30, 2012.
Feb. 2013	McKinsey Event on 3D Printing, Weston, MA "3D printing pioneer." February 28, 2013.
April 2013	Future Dialogue conference, hosted by the Max Planck Society and Siemens, April 9 - 10, 2013, in Moscow, Russia.
April 2013	MIT's Siebel Scholars Program, MIT Koch Institute, April 25, 2013.

May 2013	"Magnetic relaxation devices for minimally invasive diagnostic monitoring." MIT Annual MEDRC (Medical Electronic Device Realization Center) workshop, May 2-3, 2013 at M.I.T.
May 2013	"Innovation and Entrepreneurship in Medical Technology". Workshop of the Chemical Sciences Roundtable of the National Research Council, May 22-23, 2013 in Washington, DC.
June 2013	IP Business Congress Panel Session, June 11, 2013, Westin Waterfront Hotel, Boston, MA
Oct. 2013	Nano-biotechnology Seminar Series, Stanford University, October 10, 2013, Stanford, CA.
Dec. 2014	129th NEASC Annual Meeting and Conference, Boston Marriott Copley Place, Boston, MA, December 10-12, 2014.
January 2015	"Drug, device, or diagnostic," University of Minnesota, Minneapolis, MN, January 13, 2015.
March 2015	March Meeting 2015 of the American Physical Society, March 2-6, 2015, San Antonio, Texas.
March 2015	Symposium at the American Chemical Society, Denver, CO, March 23, 2015
July 2015	30th Aspen Cancer Conference, Aspen, CO, July 11-15, 2015.
Sept 2015	The Lemelson Foundation 20th Anniversary Celebration, Washington, D.C., September 18, 2015
Oct 2015	"Historical Overview of 3-D Printing: Do inventors know what they are doing?" Kreidl Memorial Lecture at the 27th Rio Grande Symposium on Advanced Materials October 2, 2015, Albuquerque, NM.
January 2016	Workshop January 28, 2016 in Covilhã, Portugal.
April 2016	Nanotechnology Seminar Series, Stevens Institute of Technology, April 20, 2016, Hoboken, NJ 07030
May 2016	Physiology & Biomedical Engineering Seminar Series at Mayo Clinic, May 13, 2016, Rochester, MN
July 2016	31st Aspen Cancer Conference, July 16 – 19, 2016, Aspen, CO
Feb 2017	TMS Annual Meeting, February 26 to March 2, 2017, San Diego CA
May 2017	Annual American Urological Association, May 12, 2017, Boston, MA
July 2018	33rd Annual Aspen Cancer Conference, July 14-16, 2018, Aspen, CO
Oct 2018	AVS Int'l Symposium, October 22, 2018, Long Beach, CA

Oct 2018	University of Minnesota, October 11-12, 2018, Rochester, MN
Jan, 2019	IC-ACC 2019, January 27, 2019, Daytona, FL
Jan, 2019	Purdue University, January 22, 2019, Lafayette, IN
May, 2019	Memorial Sloan Kettering Cancer Center, May 5-6, 2019, New York, NY
June, 2019	IMAT NIH/NCI, June 27-28, 2019, Bethesda, MD
July, 2019	Purdue University, July 28-30, 2019, Lafayette, IN
Sept, 2019	ACerS Award Banquet, Portland, OR
Oct, 2019	4th Annual Tech 4 Innovation Conference, Boston, MA
Oct, 2019	MDG Combination Products Forum, Weston, MA
Nov, 2019	MIT Research & Development Conference, Cambridge, MA
Dec, 2019	AUA Stone Lab, Linthicum, MD
June, 2020	MIT Alumni, Cambridge, MA (Virtual)
July, 2020	Biogen-MIT Biotech (Virtual)
Aug, 2020	Biogen-MIT Biotech (Virtual)
Sept, 2020	MIT SENSE.nano (virtual)
Nov, 2020	Google (Virtual) – Science of Chocolate
Dec, 2020	NCI – IMAT PI Annual Meeting (virtual)
April 2024	University of Michigan, Pehlke Lectureship in Materials Processing

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Y., Newburyport, MA, Almarsson, Orn, Shrewsbury, MA, Chen, Hongming, Acton, MA, McNulty, Christopher, Arlington, MA,

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Gonzalez-Zugasti, Javier P., N. Billerica, MA, Johnson, Alasdair Y., Newburyport, MA, Chen, Hongming, Acton, MA, Almarsson, Orn, Shrewsbury, MA.

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63. 20040252299, December 16, 2004, Apparatus and method for high-throughput preparation and spectroscopic classification and characterization of compositions, Lemmo, Anthony, V., Sudbury, MA, Gonzalez-Zugasti, Javier, P., N. Billerica, MA, Cima, Michael, J., Winchester, MA, Levinson, Douglas, Sherborn, MA, Johnson, Alasdair, Y., Newburyport, MA, Almarsson, Orn, Shrewsbury, MA, McNulty, Christopher, Minneapolis, Minnesota.
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Lewis, Wendy, E., Watertown, MA, Cima, Michael, J., Winchester, MA, Bornancini, Esteban, R.N., North Wales, Pennsylvania, Sherwood, Jill, K., Edison, New Jersey, Wang, Chen-Chao, West Windsor, New Jersey, Gaylo, Christopher, M., Princeton Junction, New Jersey, Fairweather, James, A., West Haven, Connecticut.

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