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Education

- Ph.D. 1996 Massachusetts Institute of Technology, Chemical Engineering, Cambridge, MA
- B.S. 1992 University of Bombay (ICT), Chemical Engineering, Mumbai, INDIA

Summary of Research Interests and Expertise

Prof. Mitragotri has made groundbreaking contributions to the field of drug delivery. His research has advanced fundamental understanding of biological barriers and has led to the development of new materials as well as technologies for diagnosis and treatment of various ailments including diabetes, cardiovascular diseases, skin diseases and infectious diseases, among others. Many of his technologies have advanced to human clinical studies and products. At the same time, fundamental understanding developed through his research has advanced the understanding of the biology of barriers in the human body. His research has made particular impact on the following areas:

Skin and Transdermal drug delivery: Prof. Mitragotri has established a fundamental knowledge base of transport properties of skin. He also developed mathematical models of skin permeation and analytical tools to study biophysics of skin structure-function relationship (*PNAS* 2005). Further, he has developed novel technologies to enable transdermal delivery of proteins, peptides and siRNA which otherwise have to be injected using needles. He has pioneered a large number of technologies including low-frequency ultrasound, pulsed microjet injector, high throughput skin experimentation, skin penetrating peptides and ionic liquids for transdermal delivery of proteins, peptides and nucleic acids. Professor Mitragotri's research has made it possible to painlessly deliver macromolecules using transdermal patches, which was previously considered not feasible. He pioneered an ultrasound-based technique to deliver insulin and vaccines through the skin (FDA-approved product for delivering local anesthesia, and human clinical trials for nanoparticle delivery for treating acne). He also developed an ultrasound-based method to harvest skin's fluid for non-invasive glucose monitoring in diabetic patients (product in late clinical trials). Using ultrasound and a novel surfactant blend, he developed a method to solubilize tissues without protein denaturation, a finding he used for non-invasive diagnostics of allergies (*PNAS* 2010). First product based on this core technology is currently marketed. Prof. Mitragotri was first to apply combinatorial discovery approaches for transdermal delivery (*Nat. Biotech.* 2004). He invented a tool (INSIGHT) that allowed, for the first time, discovery of rare formulations to deliver macromolecules (technique now used in industry for discovery of topical formulations). Recently, Prof. Mitragotri discovered a novel peptide, designed for the first time, to simultaneously enhance delivery of siRNA across the skin barrier and cell membranes for the treatment of various skin disorders (*PNAS* 2011) (technology validated in human clinical study for hyaluronic acid delivery). He also designed a novel ionic liquid as a broad spectrum topical antibiotic effective against bacteria, viruses and fungi, and simultaneously capable of delivering drugs into skin (*PNAS* 2014).

Intestine and Oral drug delivery: Prof. Mitragotri has developed fundamental understanding of trans-epithelial transport in the intestine. He has also established an understanding of the effect of penetration enhancers on permeation across the intestinal epithelium (*Pharm Res.*, 2008). Further, he developed novel technologies, in particular intestinal patches, for oral delivery of proteins such as insulin and calcitonin (*JCR*, 2004, 2013).

Immune System and Targeted drug delivery: Prof. Mitragotri has developed unique bio-inspired nanoparticles of novel physical, chemical and biological properties to understand the fundamental principles of body's immune barrier (*PNAS* 2006, 2007, 2010, and 2013a). Using these particles, he also developed new technologies for the treatment of cancer and cardiovascular diseases (*PNAS*, 2013b). He developed novel particles that mimic red blood cells (*PNAS*, 2009) and platelets (*ACS Nano*, 2014); his platelet-mimicking particles, designed as potential therapeutic agents to stop bleeding in patients suffering from traumatic blood loss, performed well in preclinical models (*ACS Nano*, 2014). He has also developed hybrid systems that make use of synthetic nanoparticles hitchhiking on natural cells for targeted delivery of drugs (*ACS Nano*, 2013).

Academic Appointments

07/07-present	Professor, Department of Chemical Engineering, UCSB
14/07-present	Professor, Technology Management Program, UCSB, affiliated faculty
13/7-present	Duncan and Suzanne Mellichamp Chair in Systems Biology and Bioengineering
12/6-present	Professor of Biology, College of Creative Studies, UCSB
11/01-present	Founding Director, Center for Bioengineering, UCSB
07/07-present	Professor, Biomolecular Science and Engineering, UCSB
13/10-15/06	Director, Translational Medicine Research Laboratories, UCSB
06/05-06/07	Associate Professor, Department of Chemical Engineering, UCSB
00/01-05/06	Assistant Professor, Department of Chemical Engineering, UCSB

Other Current Appointments (university/academic)

- Founding Editor-in-Chief, *Bioengineering & Translational Medicine*, an AIChE and SBE journal (2015-present)
- Associate Editor, *Journal of Controlled Release* (2011-present)
- Scientific Advisory Board member, Wadhvani Research Center for Bioengineering, IIT Bombay (2015-present)
- NIH Gene and Drug Delivery Study Section member (2014-present)
- BioTAP (UCSB's Technology Translation Program, Founder, co-Director) (2012-present)
- Annual Meeting Programming Committee (Controlled Release Society, 2016)
- International Advisory Board of the 11th International Conference "Medical Applications of Novel Biomaterials and Nanotechnology" of CIMTEC 2016
- Editorial Boards of the following journals
 - Journal of Drug Targeting
 - Technology
 - Therapeutic Delivery
 - Experimental Medicine and Biology

- Cancer Nanotechnology
- Journal of Laboratory Automation
- Regenerative Engineering and Translational Medicine

Other Current Appointments

- Pfizer Inc. (Technical Advisory Board member, 2014-present)
- L’Oreal (Scientific Advisory Board member, 2013-present)
- Entrega Inc. (Scientific Advisory Board member, 2011-present)
- Skinciental Biosciences (Board member, 2010-present)
- Liquideon, LLC (Board member, 2016-present)
- Ionpair Inc. (Founder, Board member, 2016-present)
- CTX Technologies (Scientific Advisory Board, 2015-present)

Awards and Honors

2016	Member, National Academy of Medicine (NAM)
2017	Academy Lectureship, Missouri Science and Technology
2016	Nagai Foundation, Tokyo Distinguished Lectureship
2016	Chair, Indo-US Frontiers of Engineering
2016	B.S. Joshi Distinguished Lecture, Institute of Chemical Technology, Mumbai
2016	Tom Watson Memorial Lecturer, University of Sydney
2015	NR Kamath Chair Professor for Institutional Excellence, IIT Bombay
2015	Thomson Reuters Highly Cited Researcher
2015	Elected Fellow, American Association of Pharmaceutical Scientists (AAPS)
2015	Elected Fellow, Biomedical Engineering Society (BMES)
2015	Andreas Acrivos Professional Progress Award, AIChE
2015	Britton Chance Distinguished Lecture at University of Pennsylvania
2015	BMM award for Excellence in Science and Technology
2015	Distinguished Endowed Lectureship, Charotar Univ. of Science and Technology, India
2015	Elected Fellow, Controlled Release Society (CRS)
2015	Member, National Academy of Engineering (NAE)
2014	Elected Fellow, National Academy of Inventors (NAI)
2014	Distinguished Alumnus Award, Institute of Chemical Technology
2014	Distinguished Bioengineering Speaker, University of California, Riverside
2013	Bold Aspiration Lecturer, University of Kansas
2012	Elected Fellow, American Association of Advancement of Science (AAAS)
2012	AIChE area 15 Plenary award
2012	AIChE area 1c Plenary Speaker
2011	Edison award for innovation, Gold Medal
2010	Edison award for Innovation, Silver Medal
2009	Kothari Visiting Professor, Institute of Chemical Technology, Mumbai, India
2009	Elected Fellow, American Institute of Medical and Biological Engineering (AIMBE)
2009	Edison award for Innovation, Bronze Medal
2008	Controlled Release Society Young Investigator Award

2008	Alan MacDiarmid Best Paper Award in Interdisciplinary Research by Society of Experimental Biology and Medicine
2005	Allan P. Colburn Award by American Institute of Chemical Engineers
2004	Controlled Release Society Outstanding Pharmaceutical Research Award
2004	Hendrick C. Van Ness Award Lecturer, Rensselaer Polytechnic Institute
2004	Pfizer-Capsugel Award for Innovation in Oral Delivery
2004	Popular Science Best of new award
2003	Global Indus Technovator Award
2003	Chancellor's Award for Excellence in Undergraduate Research
2001	Outstanding Faculty Award, UCSB
2001	Junior Faculty Research Incentive Award, UCSB
2001	3M Young faculty award
2001	Culpepper Biomedical Pilot Initiative award
2000	CRS-Dow Corning Outstanding Research Award
2000	International Research Promotion Council Young Scientist Award
1999	Technology Review Young Innovator Award (TR100)
1996	Harvard Health Letter top ten advances of the year
1995	Ebert Prize by the American Pharmaceutical Association

Translation of Technologies from the Lab

Prof. Mitragotri's inventions are being/have been actively translated into clinical products.

- Ultrasound-mediated Transdermal Delivery (sonophoresis): Professor Mitragotri's research in sonophoresis was translated by Sontra Inc., which developed and launched an ultrasonic drug delivery system (SonoPrep™) for topical anesthesia, and it has been used in humans including children. Sontra evolved into Echo Therapeutics, which is developing methods for needle-free drug delivery and glucose monitoring (Symphony™ tcGM). Symphony™ has been clinically validated in Type I and Type II diabetic patients.
- High-Throughput Transdermal Formulation Discovery: Professor Mitragotri's high throughput screening platform technology (INSIGHT) was translated by Fqubed Inc., which merged with Nuvo Research Inc. Nuvo currently markets products for pain management (Pennsaid^R and Synera^R) to treat the signs and symptoms of osteoarthritis of the knee and local anesthesia respectively. Nuvo spun-off a company, Tioga Research Inc. to further advance INSIGHT and other high throughput screening platforms.
- Pulsed Microject Injector: Professor Mitragotri's needle-free pulsed microject injectors were translated by Stratagent Lifesciences, which merged with Corium. Corium currently markets clonidine and fentanyl transdermal patches and is in Phase I human clinical studies for an Alzheimer's patch. It is also in advanced stages of development of a microneedle technology which has been validated in Phase 1 human clinical studies for PTH for osteoporosis and is currently in Phase 2a.
- Painless Skin-based Diagnostics Systems: Professor Mitragotri's vision of simple and painless diagnostics is being realized by Seventh Sense Biosystems, which has developed TAP™, a

painless wearable device for acquisition of small blood samples for diagnostics. It has received a CE mark approval. Seventh sense has partnered with Novartis, Siemens and Labcorp in 2014 to advance the technology. Seventh sense is anticipating a product launch for human use in 2016.

- Surfactant-based Biomarker Recovery from Skin: Professor Mitragotri's technology for cell and tissue solubilization for biomarker recovery is being translated by Skincential Inc. The company currently markets Clearista™ for human use for the treatment of solar Lentigo.
- Intestinal Patches for Oral Delivery of Biologics: Prof. Mitragotri's intestinal patch technology for oral delivery of biologics is being translated by Entrega Bio. Entrega announced a partnership with Google in 2014 to develop a novel diagnostic platform.
- Skin Permeating Peptides for Transdermal Delivery: Professor Mitragotri's technology of skin penetrating and cell permeating peptide (SPACE peptide) is being translated for pharmaceutical and personal care applications by CTX Technologies. CTX is developing two products Khalay™ for skin rejuvenation and Cyclopsorb™ for psoriasis. Khalay™ has been validated in humans in a clinical study. CTX announced a partnership with Zomedica in 2016.
- Transdermal Delivery of Nanoparticles: Prof. Mitragotri's ultrasound-based technology for transdermal delivery of nanoparticles is being translated by Sebacia Inc. for acne treatment. Sebacia has validated the delivery technology in a human clinical study.
- Ionic Liquids: Prof. Mitragotri's ionic liquid technology for antimicrobial and skin applications is being translated by Liquideon LLC and Ionpair Bio.

Department, Campus and Professional Service

- Prof. Mitragotri is very active in serving the department and campus through active participation in various committees over the years:
 - Faculty search
 - Undergraduate program committee
 - Undergraduate Laboratory
 - Graduate program committee
 - Graduate student admissions
 - Campus fellowships
 - Senate Faculty Awards
 - Neuroscience Research Institute, UCSB Advisory
- Prof. Mitragotri serves as a member of Cancer Research Coordination Committee (CRCC), a University of California systemwide committee overseeing funding of seed grants to support cancer research.
- Prof. Mitragotri is the founding director of UCSB's Center for Bioengineering (CBE). CBE is the epicenter of research and education at the interface between engineering sciences and biology as well as biomedicine. The Center is founded to improve the existing pathways and build new avenues to advance fundamental scientific discoveries and technological innovations in the general

area of Bioengineering at UCSB including the launch of a new Department of Bioengineering. Under Prof. Mitragotri's leadership, CBE has launched the following programs for undergraduate and graduate education in Bioengineering (bioengineering.ucsb.edu):

- Undergraduate concentration in Bioengineering
- Graduate Emphasis in Bioengineering
- Professor Mitragotri served as the director of UCSB and Cottage Hospital's Translational Medicine Research Laboratories (TMRL) from 2013-2015. TMRL aims to nucleate and nurture collaborations between UCSB researchers and clinicians to enhance clinical translation of biomedical technologies.
- Professor Mitragotri is Co-director of the Biotechnology Acceleration Program. In a collaborative program coordinated with technology and Industry Alliance, this initiative aims to assist UCSB's inventors to translate their technologies in the field of Bioengineering by providing necessary support in terms of intellectual property protection, strategic advice and support from industry experts to nurture early stage technologies.
- Professor Mitragotri has also actively participated in professional organizations. He has helped organize the following meetings:
 - Co-chair of 12th UC Systemwide Bioengineering symposium (2011)
 - Co-chair of the area of Bionanotechnology at AIChE (2007-2010)
 - Biomaterial session at the MRS Fall meeting (2009)
 - Advanced colloids at the MRS Spring meeting (2011)
 - MRS Symposium on Nanomedicine (2015)
- Professor Mitragotri has edited special issues or has served as an editor of the following journals:
 - *Advanced Drug Delivery Reviews*
 - *Pharmaceutical Research*
 - *Current Opinions in Colloid and Interfacial Sciences*
 - *Advanced Materials*
 - *PNAS*
- Professor Mitragotri has served as a reviewer for numerous grant agencies and journals.

Publications (Total citations ~ 20,700, h-index of 77, Google Scholar)

1. Anselmo AA, Prabhakarpanthian P, Pant K., and Mitragotri S., Clinical and Commercial Translation of Advanced Nanoparticle Systems: Challenges and Opportunities, *submitted*.
2. Banerjee, A., Wong J., Rohan Gogoi, R., Mitragotri, S., Intestinal Micropatches for Oral Insulin Delivery, *submitted*.
3. Anselmo, A. and Mitragotri, S., Designing Drug-Delivery Nanoparticles, *Chem. Eng. Prog.*, September 2016.

4. Niu, J., Lunn, DJ., Pusuluri, A., Yoo, J., O'Malley, M., Mitragotri, S., Soh, T. and Hawker, CJ, , Engineering live cell surfaces with functional polymers via cytocompatible controlled radical polymerization, *in revision*.
5. Zakrewsky, M. and Mitragotri, S., "Therapeutic RNAi robed with ionic liquid moieties as a simple, scalable prodrug platform for treating skin disease", *J. Control. Rel.*, in revision.
6. Wibroe, P., Anselmo, AC, Gupta V., Nilsson, P., Urbanics, R., Szebeni, J., Mitragotri, S., Mollnes, T., Moghimi, SM, "Bypassing polymeric nanoparticle-mediated adverse injection reactions through particle shape control and erythrocyte 'hitch-hiking'", *in revision*.
7. Banerjee A., Qi, J., Gogoi R., and Mitragotri, S., "Effect of Particle Shape on Transport across the Intestinal Epithelium", *J. Control. Rel.*, *J. Control. Rel.*, 238:176-85, 2016.
8. Mitragotri, S., "Introduction to Editorial Board Members: Nicholas Peppas", *Bioeng. Trans. Med.*, *in press*, 2016.
9. Decuzzi P. and Mitragotri, S., "Introduction to special issue on "nanoparticles in medicine: targeting, optimization and clinical applications", *Bioeng. Trans. Med.*, 10.1002/btm2.10012, 2016.
10. Anselmo A.C. and Mitragotri S., "Impact of Particle Elasticity on Particle-Based Drug Delivery Systems", *Advanced Drug Delivery Reviews*, S0169-409X(16)30010-2, 2016.
11. Vargas-Morales O., Zern B., Anselmo AC, Gupta V., Zakrewsky M., Mitragotri S., and Muzykantov V., "The Effect of Polymeric Nanoparticles on Biocompatibility of Carrier Red Blood Cells, Daniel Pan", *PLOSone*, 11(3):e0152074, 2016.
12. Villa C., Anselmo AC., Mitragotri S., and Muzykantov V., "Red blood cells: Supercarriers for drugs, biologicals, and nanoparticles and inspiration for Advanced Delivery Systems", *Adv. Drug. Del Rev.*, S0169-409X(16)30058-8, 2016.
13. Anselmo A.C. and Mitragotri S., "A Chemical Engineering Perspective on Targeted Nanoparticle Delivery: A Unit Process Approach", *AIChE J.*, *in press*, 2016.
14. Camacho K., Menegatti S., Vogus D., Pusluri A., Fuchs Z., Jarvis M., Zakrewsky M., Evans M., and Mitragotri S., "DAFODIL: A novel liposome-encapsulated synergistic combination of doxorubicin and 5FU for low dose chemotherapy.", *J. Control. Rel.*, 229:154-62, 2016.
15. Zakresky M., Banerjee A., Apte S., Kern T., Del Sesto R., Kopposch A., Fox D., and Mitragotri S., "Choline and Geranate Deep Eutectic Solvent as a Broad-Spectrum Antiseptic Agent for Preventive and Therapeutic Applications", *Adv. Healthcare Mat.*, 5(11):1282-9, 2016.

16. Gupta V., Hwang B.H., Doshi N., Banerjee A., Anselmo A.C., and Mitragotri S., “Oral Delivery of Exenatide and Insulin using Mucoadhesive Intestinal Devices”, *Annals of Biomed. Eng.*, 44(6):1993-2007, 2016.
17. Camacho K., Menegatti S., and Mitragotri S., “Low molecular weight Polymer-drug Conjugates for Synergistic Anticancer Activity of Camptothecin and Doxorubicin Combinations”, *Nanomedicine*, 11(9):1139-51, 2016.
18. Banerjee A., Lee J.H., and Mitragotri S., “Intestinal Mucoadhesive Devices for Oral Delivery of Insulin”, *Bioeng. Trans. Med., epub*, 2016.
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27. Kumar S., Chen M., Anselmo A.C., Muraski J.A., and Mitragotri S., “Enhanced Epidermal Localization of Topically Applied Steroids using SPACE Peptide”, *Drug Delivery and Translational Research*, 5(5): 523-530, 2015.
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29. Mitragotri S. and Hanes J., “Journal of Drug Targeting Life Time Achievement Award for Prof. Robert Lager”, *Journal of Drug Targeting*, 23(7-8): 579, 2015.
30. Kumar S., Anselmo A.C., Banerjee A., Zakrewsky M., and Mitragotri S., “Shape and size-dependent immune response to antigen-carrying nanoparticles”, *J Control Rel.*, 220(Pt A): 141-148, 2015.
31. Anselmo A.C. and Mitragotri S., “A Review of Clinical Translation of Inorganic Nanoparticles”, *AAPS J.*, 17(5): 1041-1054, 2015.
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47. Rotstein R., Mitragotri S., Moskovits M., and Morse D.E., “Progressive Transition From Resonant to Diffuse Reflection in Anisotropic Colloidal Films”, *J. Polymer Sci. Part B: Polymer Physics*, 52(9): 611-617, 2014.
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212. Mitragotri S., Blankschtein D., and Langer R., "Ultrasound-Mediated Transdermal Protein Delivery", *Science*, 269(5225): 850-853, 1995.

Patents (Only published applications are listed)

1. US Patent 9,328,324 System, method and devices for tissue-based diagnosis
2. US Patent 9,308,181, Topical formulations, systems and methods
3. US Patent 8,945,482, System, method and device for tissue-based diagnosis
4. US Patent 8,870,810, Method and apparatus for enhancement of transdermal transport
5. US Patent 8,791,062, Skin permeating and cell entering (SPACE) peptides and methods of use thereof
6. US Patent 8,642,664 Composition for solubilizing tissue and cells comprising N-tetradecyl-N,N-dimethyl-3-ammonio-1-propanesulfonate and polyoxyethylene (10) cetyl ether
7. U.S. Patent, 8,609,041, Apparatus for solubilizing tissue
8. U.S. Patent, 8,518,871, Skin permeating and cell entering (SPACE) peptides and methods of use thereof
9. U.S. Patent, 8,513,304 Topical Formulations
10. U.S. Patent, 8,389,582 Composition for solubilizing tissue comprising 3-(decyl dimethyl ammonio) propane sulfonate and tetraethylene glycol dodecyl ether
11. U.S. Patent, 8,343,962, Topical Formulation
12. U.S. Patent, 8,287,483, Method and apparatus for enhancement of transdermal transport
13. U.S. Patent, 8,277,762, Apparatus and methods for evaluating the barrier properties of membrane

14. U.S. patent, 8,021,323, Soft tissue augmentation by needle-free injection.
15. U.S. patent 7,795,309 Topical formulation including diclofenac, or a pharmaceutically acceptable salt thereof.
16. U.S. patent 7,648,739 Switchable surfaces.
17. U.S. patent 7,020,355, Switchable surfaces.
18. U.S. patent , 6,887,239, Preparation for transmission and reception of electrical signals.
19. U.S. patent, 6,620,123, Method and apparatus for producing homogenous cavitation to enhance transdermal transport
20. U.S. patent, 6,589,173, Ultrasound system for disease detection and patient treatment
21. U.S. patent , 6,491,657, Ultrasound enhancement of transdermal transport
22. U.S. patent , 6,234,990, Ultrasound enhancement of transdermal transport
23. U.S. patent , 6,190,315, Sonophoretic enhanced transdermal transport
24. U.S. patent , 6,041,253, Effect of electric field and ultrasound for transdermal drug delivery
25. U.S. patent , 6,018,678, Transdermal protein delivery or measurement using low-frequency sonophoresis
26. U.S. patent , 6,002,961, Transdermal protein delivery using low-frequency sonophoresis
27. U.S. patent , 5,947,921, Chemical and physical enhancers and ultrasound for transdermal drug delivery
28. U.S. patent, 5,814,599, Transdermal delivery of encapsulated drugs

29. 20160101056, MUCOADHESIVE DEVICES FOR DELIVERY OF ACTIVE AGENTS
30. 20160030726, METHODS OF DELIVERING NANOSHELLS INTO SEBACEOUS GLANDS
31. 20160015890 SYSTEM AND METHOD OF VARIABLE DOSE GLUCAGON DELIVERY
32. 20160000881 Oral Drug Devices and Drug Formulations
33. U.S. Patent application 20150344834 System, Method and Devices for Tissue-Based Diagnosis
34. U.S. Patent application 20150297723, TOPICAL FORMULATIONS FOR TREATING SKIN CONDITIONS
35. U.S. Patent application 20150275174, COMPOSITIONS FOR SOLUBILIZING CELLS AND/OR TISSUE
36. US Patent application 20150238435, Oral Drug Devices and Drug Formulations
37. US Patent application 20150174076, MUCOADHESIVE DEVICES FOR DELIVERY OF ACTIVE AGENTS
38. U.S. Patent application 20150025221, Skin Permeating and Cell Entering (SPACE) Peptides and Methods of Use Thereof
39. US. Patent application 20140227174, SKIN PERMEATING AND CELL ENTERING (SPACE) PEPTIDES AND METHODS OF USE THEREFOR
40. US. Patent Application 20140161871, SKIN PERMEATING AND CELL ENTERING (SPACE) PEPTIDES AND METHODS OF USE THEREOF

41. US Patent Application 20140107560 Compositions for solubilizing cells and/or tissue
42. US. Patent Application 20130337031, TOPICAL FORMULATIONS, SYSTEMS AND METHODS
43. US. Patent Application 20130274352, Oral Drug Devices and Drug Formulations
44. U.S. Patent application 2013115169, Red Blood Cell-mimetic particles and methods for making use thereof
45. US Patent application 20130079404 Topical Formulation
46. U.S. Patent application 20130035566, Method and Apparatus for Enhancement of Transdermal Transport
47. U.S. patent application 20120253238, COMPOSITIONS FOR SOLUBILIZING CELLS AND/OR TISSUE
48. U.S. patent application 20120128756, Skin Permeating And Cell Entering (SPACE) Peptides and Methods of Use Thereof
49. U.S. Patent application 20120045504, ORAL DRUG DEVICES AND DRUG FORMULATIONS
50. U.S. Patent application 20120004592, COMPOSITIONS FOR SOLUBILIZING TISSUE
51. U.S. Patent application 20110295149, APPARATUS FOR SOLUBILIZING TISSUE
52. U.S. Patent application 20110212485, SYSTEM, METHOD AND DEVICE FOR TISSUE-BASED DIAGNOSIS
53. U.S. Patent application 20110028460, TOPICAL FORMULATION
54. U.S. Patent application 20100261176, Methods of Tissue-Based Diagnosis
55. U.S. Patent application 20100217403, SWELLABLE HYALURONIC ACID PARTICLES
56. U.S. Patent application 20100029769, TOPICAL FORMULATION
57. U.S. Patent application 20090105260, Molecules to Enhance Percutaneous Delivery and Methods for Discovery Therefor
58. U.S. Patent application 20090030367, SOFT TISSUE AUGMENTATION BY NEEDLE-FREE INJECTION
59. U.S. Patent application 20090022808, Coated Hyaluronic Acid Particles
60. U.S. Patent application 20080221212, TOPICAL FORMULATION
61. U.S. Patent application 20080112886, ENGINEERING SHAPE OF POLYMERIC MICRO- AND NANOPARTICLES
62. U.S. Patent application 20070269379, Penetration Enhancer Combinations for Transdermal Delivery
63. U.S. Patent application 20070183936, Apparatus and methods for evaluating the barrier properties of a membrane
64. U.S. Patent application 20060263033, Switchable surfaces
65. U.S. Patent application 20060088579, Transdermal drug delivery systems
66. U.S. Patent application 20060015058, Agents and methods for enhancement of transdermal transport
67. U.S. Patent application 20050181029, Distributed drug dispensing matrix as a transdermal patch
68. U.S. Patent application 20050049474, Preparation for transmission and reception of

- electrical signals
69. U.S. Patent application 20040236268, Method and apparatus for enhancement of transdermal transport
 70. U.S. Patent application 20040210184, Effect of electric field and ultrasound for transdermal drug delivery
 71. U.S. Patent application 20040171980, Method and apparatus for enhancement of transdermal transport
 72. U.S. Patent application 20040087879, Method and apparatus for producing homogenous cavitation to enhance transdermal transport
 73. U.S. Patent application 20040039418, Preparation for transmission and reception of electrical signals
 74. U.S. Patent application 20040023841, Combinatorial method for rapid screening of drug delivery formulations
 75. U.S. Patent application 20030142901, Switchable surfaces
 76. U.S. Patent application 20030017195, Method for oral drug delivery
 77. U.S. Patent application 20020045850, Ultrasound enhancement of transdermal transport
 78. U.S. Patent application 20010056255, Effect of electric field and ultrasound for transdermal drug delivery
 79. WO/2016/033314 SKIN PENETRATING PEPTIDES (SPPS) AND METHODS OF USE THEREFOR
 80. WO/2015/191629 SYSTEM AND METHOD OF VARIABLE DOSE GLUCAGON DELIVERY
 81. PCT (WO/2015/117158) SYNTHETIC PLATELETS
 82. PCT (WO/2015/066647) IONIC LIQUIDS FOR TRANSDERMAL DRUG DELIVERY
 83. PCT (WO/2015/026552) MUCOADHESIVE DEVICES FOR DELIVERY OF ACTIVE AGENTS
 84. PCT (WO/2014/160404) IMPROVED ORAL DRUG DEVICES AND DRUG FORMULATIONS
 85. PCT (WO/2014/145784) METHODS OF DELIVERING NANOSHELLS INTO SEBACEOUS GLANDS
 86. PCT (wo/2014/123543) SKIN PERMEATING AND CELL ENTERING (SPACE) PEPTIDES AND METHODS OF USE
 87. PCT (WO/2013/188819) MUCOADHESIVE DEVICES FOR DELIVERY OF ACTIVE AGENTS
 88. PCT (WO/2013/172832), COMPOSITIONS FOR SOLUBILIZING CELLS AND/OR TISSUE
 89. PCT WO/2012/064429 - SKIN PERMEATING AND CELL ENTERING (SPACE) PEPTIDES AND METHODS OF USE THEREOF
 90. PCT WO/2011/069082 - RED BLOOD CELL-MIMETIC PARTICLES AND METHODS FOR MAKING AND USE THEREOF
 91. PCT (WO 2010/120892) Improved oral drug devices and drug formulations
 92. PCT (WO 2010/093861) System, method and device for tissue-based diagnostics
 93. PCT (WO 2009/048681) Methods of Tissue-based diagnostics
 94. PCT (WO 2008/147817) Coated Hyaluronic Acid Particles

95. PCT (WO 2008/031035) Engineering shape of polymeric micro- and nanoparticles
96. PCT (WO 2007/102090) Topical formulation
97. PCT (WO 2006/091877) Agents and methods for enhancement of transdermal transport.
98. PCT (WO 2006/091297) Molecules to enhance percutaneous delivery and methods for discovery therefore
99. PCT (WO 2005/012549) Apparatus and methods for evaluating the barrier properties of a membrane
100. PCT (WO 2005/009510) Penetration enhancer combinations for transdermal delivery
101. PCT (WO 2004/032970) Carriers attached to blood cells
102. PCT (WO 2003/090366) Preparation for transmission and reception of electrical signals
103. PCT (WO 2003/066130) Transdermal drug delivery systems
104. PCT (WO 2003/055590) Switchable surfaces
105. PCT (2003/007913) Method for oral drug delivery
106. PCT (2002/016941) A combinatorial method for rapid screening of drug delivery formulations
107. PCT (WO 2001/076553) Method and device for enhanced transdermal drug delivery
108. PCT (WO 2000/035357) Method and apparatus for enhancement of transdermal transport
109. PCT (WO 2000/035351) Method and apparatus for producing homogeneous cavitation to enhance transdermal transport
110. PCT (WO 034857) Sonophoretic enhanced transdermal transport
111. PCT (WO 1998/000194) Ultrasound enhancement of transdermal transport
112. PCT (WO 1997/004832) Enhanced transdermal transport using ultrasound

Unpublished patent applications are not listed.

Presentations

Professor Mitragotri has given ~500 invited and contributed presentations.

Courses Taught

ChE 1A-Engineering and the Scientific Method
 ChE 119-Current Events in Chemical Engineering
 ChE 120A-Transport Processes
 ChE 120B - Transport Processes
 ChE 125-Principles of Bioengineering
 ChE 180A-Chemical Engineering Laboratory
 ChE 180B-Chemical Engineering Laboratory
 BMSE 252-Principles of Bioengineering

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Professor Mitragotri's laboratory has been funded over the years through numerous agencies including NIH, CDC, NSF, NIOSH, NIST, DTRA, DOD, Juvenile Diabetes Foundation, Keck Foundation American Diabetes Association, Whitaker Foundation, Rockefeller Brothers Fund, Otis Williams Fund, Errett Discovery Fund, University of California Biotech Program, University of California Biotechnology Research and Education Program, University of California Discovery Program, UCSB academic senate, University of California National Lab Fee Program, Telemedicine and Advanced Technology Research Center, Cottage Hospital, David Ju Foundation as well as numerous companies including 3M, Abbott, Allergan, CFDR, Cellerant, Corporation, Corning, Convoy, Cytodome, Dr. Reddy's Laboratories, DX Biosciences, Ekos, Enlight, Follica, Genentech, GlaxcoSmithKline, Higuchi, Hisamitsu, ISIS Pharmaceuticals, Life Technologies, Pfizer, Sebacia, Seventh Sense Biosystems and Sontra Medical.

Mentoring

Graduate Students and Post-docs Supervised

Jagannathan Sundaram (2002, Amgen), Ahmet Tezel (2004, Novartis), Joy Schramm (2004), Pankaj Karande (2005, faculty at RPI), Elizabeth Chambers (2006, Clorox), Anh-Tuan Dinh (2006, Archimedes), Chinmay Pangarkar (2006, Theranos), Julie Champion (2007, faculty at Georgia Tech), Kathryn Whitehead (2007, faculty at CMU), Sejal Hall (2008, Novartis), Anubhav Arora (2009, Noven), Sumit Paliwal (2009, Novartis), Nishit Doshi (2010, Theranos), Tracy Hsu (2011, Gilead), Poornima Kolhar (2012, Theranos), Chris Brunquell (2012, University of Connecticut), Aaron Anselmo (2015, MIT), Kathryn Camacho (2015, BMS), Michael Zakrewsky (2016, Gilead), Douglas Vogus (current), Anusha Pusuluri (current), Mengwen Zhang (current), Maxymillan Nowak (current), Maria Jarvis (current), Tyler Brown (Current), David Smith (current), Apporva Sarode (current), Michael Evans (current), Debra Wu (current), Kevin Peng (current), Dr. Elisabeth Kaltonbock (2002), Dr. Zancong Shen (2003, Ardea Biosciences), Dr. Amit Jain (2005, Corium Pharmaceuticals), Dr. Yogesh Katare (2006, faculty at VNS Institute of Pharmacy, Bhopal, India), Dr. Eiichi Torisaka (2008), Dr. Alisar Zahr (2008, Johnson & Johnson), Dr. Linden Bolisay (2010, L'Garde), Dr. Yasunari Michinaka (2010, Hisamitsu), Dr. Monica James-Smith (2010, Lubrizol), Dr. Makoto Ogura (2010, Hisamitsu), Dr. Jinwook Yoo (2010, faculty at College of Pharmacy, Pusan National University, South Korea), Rikke Benjamensen (2010, Technical University of Denmark), Dr. Zhimin Zhou (2011, Chinese Academy of Sciences), Maarten Bakker (2013, Eindhoven University), Dr. Paul Tumeh (2012, UCLA Medical School), Sunali Bhatnagar (2013, Oxford University), Dr. Vivek Gupta (2013, faculty at Keck Graduate Institute), Tomoyuki Mitoma (2014, Higuchi), Dr. Byeonghee Hwang (2013, faculty at Incheon National University), Francesca Cavalieri (2014), Dr. Sutapa Barua (2014, faculty at Missouri Science and Technology), Dr. Ming Chen (2014), Dr. Sunny Kumar (2014, Allergan), Dr. Stefano Menegatti (2015, faculty at NC State), Dr. Amrita Banerjee (current), Kazuhiro Ayogi (2014, Nitto-Denko), Renwei Chen (current), Vinu Krishnan (current), Jianping Qi (2016), Yasunori Iwao (2016).

Undergraduate Student Projects

Philip Le (2000), Marc Soares (2000), Brian Kluck (2001), Ashley Sanders (2002), Emile Plise (2001), Joe Tucherer (2001), Elizabeth Mallon (2000), Nicarter Gordon (2000), Maria Casanon (2002), Ruben Ayala (2001), Justin Cisar (2001), Michael Hedvat (2002), Vivian Shen (2001), Adam Hartwick (2001), Ana Mistic (2002), Courtney Still (2002), Penny Letts (2001), Tamara Murray (2001), Ocean Feniger

(2001), Nitasha Bakhru (2002), May Brickey (2001), Veronica Mora (2001), Armondo Jimenez (2001), Seth Sanford (2001), Kathy Bange (2001), Eve Lee (2001), Richard Keeler (2001), Beison Ramirez (2001), Haydee Rodriguez (2001), Brian Piorek (2002), Paul Andersen (2002), Kelly Smith (2002), Berlyn Mellein (2002), Luis Diaz (2002), Nocol Balquidra (2002), Jefferey Katrencik (2002), Lauren Fix (2002), Celia Chen (2002), Araceli Rojo (2002), Maricela Casteneda (2002), Steve Bush (2002), Jeff Oneil (2002), Cecelio Morello (2002), Drew Lassen (2002), Amanda Walker (2003), Ashwinin Ashokkumar (2003), Tawni Koutchesfahani (2003), Tiffany Coleman (2003), Arthur Wojcicki (2003), Kaitleen Ergun (2003), Nicholas Williams (2003), Thien Khahn Pham (2003), Moon Jean Ho (2004), Vincent Kispersky (2004), Thomas Minner (2004), Varun Bharadwaj (2004), Heather Becker-Brungard (2005), Natalie Karr (2005), Casey Schmidt (2006), Santosh Gupta (2006), Alejandro Sanchez (2006), Gabriel Martinez (2006), Zareen Zapadia (2006), Chang (2009), Brian Ilker (2009), Ari Pritchard-Bell (2009), Lindsay Palmer (2008), Natalie Karr (2008), Shayla Brooks (2008), David Wilson (2008), Alex Morales (2008), Jordanne Gregorio (2008), Ricardo Alamillo (2009), Nancy Annunziato (2009), Brittney Hellner (2008), Marjorie Fernandez (2008), Steven Pease (2008), Holly Bovey (2008), David Gebauer (2008), Jordanne Wang (2011), Michael Grambow (2011), Martin Manley (2011), Michele Corrigan (2011), Martin Bryant (2011), Nathan Dias (2011), Daniel Schiffels (2011), Jessica Hoy (2011), Yuan Pan (2011), Dana Rutherford (2011), Vivian Le (2012), Joohee Lee (2012), Michael Lam (2012), Aaron Whitelach (2012), Mayra Perez (2012), Amberneil Roy (2012), Zoë Fuchs (2013), Dilpreet Kaur (2013), Austin Pearce (2013), Analisa Ragusa (2013), Vanessa Wagner (2013), Zoe Fuchs (2015), Joshua de Oliveira (2014) , Sachi Dholakia (2014), Brigid Ehrlich (2014), Rohan Gogoi (2015), Nathaniel Mosk (2014), Marshall Pittman (2014), Ami Thakrar (2014), Jessica Wong (2014), Sateja Paradkar (2015), Sanjana Apte (2015), Rohit Bhatt (2015), Jennifer Lee (2015), Michael Arnold (2015), Elaine Bunyan (2015), Gauree Chendke (2015), Francis Cunningham (2015), Ileana Garcia (2015), Ravinderdeep Gill (2015), Sam Kretchmar (2015), Valerie Lensch (2015)