

Biographical Sketch

Professor Samir Mitragotri, University of California, Santa Barbara



Positions Held

- Professor, Chemical Engineering.
- Founding Director, Center for Bioengineering

Education

- Ph.D., MIT, 1996
- B.S., Institute of Chemical Technology, Mumbai, 1992

Research Interests: Transdermal Drug delivery, Oral Drug Delivery, Targeted Drug Delivery

Advancement of fundamental understanding of transport processes across biological barriers and development of new materials and technologies to enable drug delivery to treat various diseases.

Notable Research Accomplishments

Structure-function relationships of skin permeation; Discovery of low-frequency ultrasound for transdermal protein delivery and glucose monitoring; Invention of high throughput screening of skin penetration enhancers; Design of pulsed microjet injector; Discovery of skin and cell penetrating peptides for topical delivery; Discovery of ionic liquids for broad spectrum antibiotics and topical delivery; Structure-function relationships of intestinal permeation; Conceptualization and demonstration of mucoadhesive intestinal patches for oral delivery of proteins; Synthesis of particles of unique shapes and demonstrating their advantages for drug delivery; Conceptualization and design of synthetic-natural hybrid systems for targeted drug delivery; Design of synthetic platelets and red blood cells for hemostasis and drug delivery.

Publications and Patents

- Over 200 publications in scientific journals including *Science*, *Nature Medicine*, *Nature Biotechnology*, *Nature Materials*, *PNAS*, *ACS Nano* and *Advanced Materials*.
- Over 275 invited lectures in various conferences and universities around the world.
- Inventor on over 100 pending or issued patents.
- More than 20,700 citations (h-index of 77).
- Work highlighted in numerous popular and news media including *Scientific American*, *Popular Science*, *R&D Magazine*, *New York Times*, *USA Today* and *Discover Magazine*.
- Inventions translated into clinical technologies through several small companies (Sontra, fqubed, Nuvo, Tioga, Stratagent, Liqueleon, Seventh Sense, Dx, Entrega, CTX) and large companies.
- Editor-in-chief of Bioengineering and Translational Medicine and Associate Editor of *Journal of Controlled Release*

Awards

- Elected member of NAE and NAM
- Fellow of NAI, CRS, AAPS, BMES, AAAS and AIBME
- American Institute of Chemical Engineering's Allan P. Colburn award for outstanding publication record
- Andreas Acrivos Professional Progress award by American Institute of Chemical Engineering
- Technology Review Young Inventor award (TR35) for technological innovation.
- Chancellor's award for excellence in undergraduate research.

Mentorship

- Mentored over 60 graduate students and post-docs, and research projects of over 100 undergraduate students

Select Publications from recent years

1. Zakrewsky M, Lovejoy K, Kern T, Miller T, Le V, Nagy A, Goumas A, Iyer R, Del Desto R, Koppisch A, Fox D, Mitragotri S., Ionic liquids as a class of materials for transdermal delivery and pathogen neutralization, *PNAS*, 111(37):13313-8, 2014.
2. Mitragotri S, Burke PA, Langer R., Overcoming the challenges in administering biopharmaceuticals: Formulation and delivery strategies, *Nature Reviews Drug Discovery*, 13(9):655-72, 2014.
3. Kolhar P, Anselmo AC, Gupta V, Prabhakarandian B, Pant K, Ruoslahti R, Mitragotri S., Using shape effects to target nanoparticles to lung and brain endothelium, *PNAS*, 110(26):10753-8, 2013.
4. Barua S, Yoo JW, Kolhar P, Wakankar A, Gokarn YR, Mitragotri S., Particle shape enhances specificity of antibody-displaying nanoparticles, *PNAS*, 110(9):3270-5, 2013
5. Pino CJ, Gutterman JU, Vonwil D, Mitragotri S, Shastri VP, Glycosylation facilitates transdermal transport of macromolecules, *PNAS*, 109(52):21283-8, 2012
6. Modery-Pawłowski CL, Tian LL, Pan V, McCrae KR, Mitragotri S, Sen Gupta A., Approaches to synthetic platelet analogs, *Biomaterials*, 34(2):526-41, 2013.
7. Lee KJ, Yoon J, Rahmani S, Hwang S, Bhaskar S, Mitragotri S, Lahann J., Spontaneous shape reconfigurations in multicompartamental microcylinders, *PNAS*. 109(40):16057-62, 2012.
8. Hsu T. and Mitragotri S., A peptide enhancer for transdermal delivery of siRNA and other macromolecules, *PNAS*, 108(38):15816-21, 2011.
9. Yoo, JW, Irvine DJ, Discher DE and Mitragotri, S., Bio-inspired, bioengineered and biomimetic drug delivery carriers, *Nature Reviews Drug Discovery*, 10(7):521-35, 2011.
10. Paliwal S, Ogura M, Mitragotri S, One-step acquisition of functional biomolecules from tissues, *PNAS*, 107(33):14627-32, 2010..
11. Yoo JW, Mitragotri S., Polymer particles that switch shape in response to a stimulus, *PNAS*, 107(25):11205-10, 2010.
12. Doshi, N., Zahr, A., Bhaskar, S., Lahann S., and Mitragotri, S., Red blood cell-mimicking synthetic biomaterial particles, *PNAS*, 106(51):21495-9, 2009.
13. Mitragotri, S. and Lahann J., Physical approaches to biomaterial design, *Nature Materials*, 8(1): 15-23, 2009.
14. Champion J., Katare Y., and Mitragotri, S., Making Polymeric Micro- and Nanoparticles of Complex Shapes, *PNAS*, 104(29), 1901-4, 2007.
15. Champion J. and Mitragotri, S., Role of Target Geometry in Phagocytosis, *PNAS*, 103(13): 4930-4, 2006.
16. Mitragotri, S., Immunization without Needles, *Nature Reviews Immunology*, 5(12): 905-16, 2005.
17. Karande, P., Jain, A., and Mitragotri, S., Design Principles of Chemical Penetration Enhancers for Transdermal Drug Delivery, *PNAS*, 102(13): 4688-93, 2005.
18. Mitragotri, S., Jain A., and Mitragotri, S., Discovery of Safe and Potent Transdermal Penetration Enhancers by High Throughput Screening, *Nature Biotechnology*, 22 (3): 192- 197, 2004.