

## Biographical Sketch

**Provide the following information for each individual included in the Research & Related Senior/Key Person Profile (Expanded) Form.**

NAME  ANIRBAN SEN GUPTA	POSITION TITLE: PROFESSOR OF BIOMEDICAL ENGINEERING, CASE WESTERN RESERVE UNIVERSITY		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(S)	FIELD OF STUDY
The University of Calcutta (Kolkata, India) The University of Calcutta (Kolkata, India) The University of Akron, Ohio Case Western Reserve University	B.Sc. (HONORS) B.Tech. MS, PhD Senior Research Associate	1992-1995 1995-1998 1999-2003 2003-2006	Chemistry Chemical Engineering Chemical Engineering Biomedical Engineering

### RESEARCH AND PROFESSIONAL EXPERIENCE

I have the interdisciplinary education and training, research expertise, leadership, and mentoring experience necessary to successfully direct research and mentoring in the fields of bioinspired materials, hemorrhage control, nanomedicine, drug delivery and wound healing. For over 20 years I have directed extensive research in drug delivery and nanomedicine areas by developing novel nanoparticle and microparticle platforms inspired by hemostatic mechanisms of blood platelets in various disease scenarios. To this end, my laboratory has developed platelet-inspired biomedical technologies that have applications in the areas of hemostasis, thrombosis, inflammation, immune response and cancer metastasis. Examples of our technology applications include ‘synthetic platelet’ (SynthoPlate) technologies as intravenous hemostats for transfusion applications in bleeding management (trauma and Hem/Onc), clot-targeted thrombolytic drug delivery systems, cell-targeted photodynamic nanomedicine therapies, drug delivery systems that target circulating tumor cells etc. These research projects have received funding support from the NIH, National Centers for Accelerated Innovation-Cleveland Clinic, AHA, American Cancer Society, Case Coulter Translational Research Partnership Program. My laboratory has published ~ 80 peer-reviewed articles (H-index: 40) in these various areas. I serve as a faculty and mentor for Biomedical Engineering, Pathology and Pharmacology programs at CWRU. I have served as a council member, session chair and member of Diversity task force for the Society for Biomaterials (SFB), and track and session chair for Biomedical Engineering Society (BMES). I serve as the faculty mentor of CWRU student chapter of Society for Biomaterials. I serve in editorial roles for Biomaterial (Elsevier), ACS Biomaterials Science and Engineering (ACS), Journal of Thrombosis and Haemostasis (Wiley-Blackwell), and Bioactive materials (Elsevier). I also serve as a reviewer for NIH, NSF, AHA and DoD, and as a peer reviewer for numerous scientific journals. My laboratory has active research collaborations within CWRU, as well as with Cleveland Clinic Foundation, University of Pittsburgh, Harvard University, University of Pennsylvania, UNC Chapel Hill, North Carolina State University, University of Colorado Denver, University of Michigan Ann Arbor, University of Birmingham UK, INSERM Paris, University of Munich Germany, and US Army Institute of Surgical Research San Antonio. In hemorrhage control technologies, I am an inventor on multiple patents in vascular nanomedicine systems and portable coagulometry devices. I am a Fellow of the American Institute for Medical and Biological Engineering, Fellow Biomaterials Science and Engineering, and Senior Member in National Academy of Inventors. I have also co-founded a company, Haima Therapeutics, for translational development of various technologies developed in our laboratory.

## RESEARCH AND PROFESSIONAL EXPERIENCE (CONTINUED).

### Positions and Employment

June 1997 to Aug 1997	Engineer, Primary Reforming Unit, Hindustan Fertilizer Corp., India
June 2001 to Aug 2001	Doctoral Research Intern, Polymer R & D, Guilford Pharmaceutical Inc., Baltimore, Maryland
May 2002 to Aug 2002	Doctoral Intern, Colloids and Interfaces Lab, The Procter & Gamble Co., Corporate Analytical Research Division, Cincinnati, Ohio
Aug 1999 to Aug 2003	Research Assistant, Biomaterials Lab, Dept. of Chemical Engineering The University of Akron, Akron, Ohio
Sept 2003 to Dec 2005	Research Associate, Dept. of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio
Jan 2006 to Aug 2006	Senior Research Associate, Dept. of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio
Sept 2006-April 2014	Assistant Professor, Dept. of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio
April 2014 – Dec 2017	Associate Professor, Dept. of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio
Jan 2018– present	Professor, Dept. of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio

### Honors and Awards

1995	National Scholar Award, B.Sc. (HONORS), India
Aug1999 to May 2003.	Graduate Research Scholarship, The University of Akron, Ohio
2001	First Prize in Research Poster, ISPE, Great Lakes Chapter
2009, 2010, 2011, 2011	Nominated for Wittke Award and Jackson Award for Excellence in Undergraduate Teaching and Mentoring at CWRU
2012	Nominated for Diekhoff Award for Excellence in Graduate Teaching and Mentoring at CWRU
2011	Outstanding Teacher Award, CWRU BMES
2014	Outstanding Mentoring Award, CWRU BMES
2018	CWRU Council to Advance Human Health (CAHH) Award
2019	Case School of Engineering Innovation Award
2021	Fellow, American Institute for Medical and Biological Engineering
2022	Leonard Case Jr. Endowed Professor of Engineering, CWRU
2023	Wallace R. Persons Endowed Professor of Engineering, CWRU
2024	Fellow, Biomaterials Science and Engineering
2024	Senior Member, national Academy of Inventors

### Other Experience and Professional Memberships:

2003-present	Member, Biomedical Engineering Society
2003-present	Member, Society For Biomaterials
2014-present	Study Section member for NIH, NSF, AHA and DoD
2021-present	Member, Hemostasis and Thrombosis Research Society
2019-present	International Society for Thrombosis and Haemostasis
2022- present	Member, Working Group on Hemostasis and Thrombosis, ASH

## PUBLICATIONS:

1. A. Sen Gupta, S.T. Lopina, L-tyrosine-based backbone-modified poly(amino acids). *J. Biomat. Sci. Polym. Ed.*, 2002,13, p1093. PMID: 12484486
2. A. Sen Gupta, S.T. Lopina, Development of novel “Pseudo” polypeptidic biodegradable polymers based on natural amino acid L-tyrosine for biomaterial application. *Materials Science Forum*, 2003, 426-432, p3261.
3. M.V. Chaubal, A. Sen Gupta, S.T. Lopina, D. F. Bruly, Polyphosphates and other phosphorus containing polymers for drug delivery applications, *Critical Reviews in Therapeutic Drug Carrier Systems*. 2003, 20, p295. PMID: 14635982
4. A. Sen Gupta, S.T. Lopina, Investigation of “solid phase” synthesis of Tyrosine-derived diphenol monomers with resin-bound carbodiimide coupling reagents. *J. Polym., Sci., Part A., Polym. Chem.*, 2004, 42, p4906.
5. A. Sen Gupta, S.T. Lopina, Synthesis and characterization of L-tyrosine based novel polyphosphates. *Polymer*, 2004, 45, 14, p4653.
6. A. Sen Gupta, S.T. Lopina, Properties of L-tyrosine based polyphosphates pertinent to potential biomaterial applications. *Polymer*, 2005, 46, 17, p2133.
7. A. Sen Gupta, G. Huang, B.J. Lestini, S. Sagnella, K. Kottke-Marchant and R.E. Marchant, RGD-modified liposomes targeted to activated platelets as a potential vascular drug delivery system. *Thrombosis and Haemostasis*, 2005, 93, p106. PMID: 15630499. (Journal Cover Awarded).
8. A. Sen Gupta, S. Wang, E. Link, E. H. Anderson, C. Hofmann, J. Lewandowski, K. Kottke-Marchant, R.E. Marchant, Glycocalyx-mimetic dextran-modified poly(vinyl amine) surfactant coating reduces platelet adhesion on medical-grade polycarbonate surface. *Biomaterials*, 2006, 27, p3084. PMID: 16460796
9. G. Huang, Z. Zhou, R. Srinivasan, M.S. Penn, K. Kottke-Marchant, R.E. Marchant, A. Sen Gupta. Affinity manipulation of surface-conjugated RGD peptide to modulate binding of liposomes to activated platelets. *Biomaterials*, 2008, 29, p1676. PMID: 18192005.
10. D. Sarkar D, J-C. Yang, A. Sen Gupta, S.T. Lopina. Synthesis and characterization of L-tyrosine based polyurethanes for biomaterial applications. *J Biomed Mater Res Part A*. 2009, 90, p263. PMID: 18496869.
11. S. Wang, A. Sen Gupta, S. Sagnella, P McVicker, K Kottke-Marchant, R E Marchant. Biomimetic fluorocarbon surfactant polymers reduce platelet adhesion on PTFE/ePTFE surface. *J Biomat Sci, Polym Ed*, 2009, 20, p619. PMID: 19323880
12. R. Srinivasan, R. E Marchant, A. Sen Gupta. In Vitro and In Vivo Platelet Targeting By Cyclic RGD-modified Liposomes. *J Biomed Mater Res: Part A*. 2010, 93, p 1004. PMID: 19743511
13. A.M. Master, M.E. Rodriguez, M.E. Kenney, N.L. Oleinick, A. Sen Gupta. Formulation of photosensitizer Pc 4 in in PEG-PCL micelles and in vitro PDT studies. *J Pharm Sci*. 2010, 99, p2386. PMID: 19967780
14. B. Holt, A. Sen Gupta. Streptokinase loading in liposomes for vascular targeted nanomedicine applications: encapsulation efficiency and effects of processing. *J Biomat Appli* (ePub ahead of print, 2010). PMID: 20659961
15. A. Sen Gupta. Nanomedicine Approaches in Vascular Disease: A Review. *Nanomedicine: Nanotechnology, Biology and Medicine* (ePub ahead of print, 2011). PMID: 21601009
16. A.M. Master, Y. Qi, N.L. Oleinick, A. Sen Gupta. EGFR-mediated Intracellular Delivery of Pc 4 Nanoformulation for Targeted Photodynamic Therapy of Cancer: In Vitro Studies. *Nanomedicine: Nanotechnology, Biology and Medicine* (ePub ahead of print, 2011). PMID: 22024195
17. C. Modery, M. Ravikumar, T. Wong, M. Dzuricky, N. Durongkaveroj, A. Sen Gupta. Heteromultivalent Liposomal Nanoconstructs for Enhanced Targeting and Shear-stable Binding to Active Platelets for Site-selective Vascular Drug Delivery. *Biomaterials* (ePub ahead of print, 2011). PMID: 21906806
18. M. Ravikumar, T. Wong, C. Modery, A. Sen Gupta. Peptide-decorated Liposomes Promote Arrest and Aggregation of Activated Platelets under Flow on Vascular Injury Relevant Protein Surfaces In Vitro. *Biomacromolecules* 2012, 13, 1495–1502

19. M. Ravikumar, C. Modery, T. Wong, A. Sen Gupta. Mimicking Adhesive Functionalities of Blood Platelets using Ligand-decorated Liposomes. (Accepted for publication, *Bioconjugate Chemistry*, April 2012). dx.doi.org/10.1021/bc300086d
20. A. M. Master, M. Livingston, N.L. Oleinik, A. Sen Gupta. Optimization of a Nanomedicine-Based Silicon Phthalocyanine 4 Photodynamic Therapy (Pc 4-PDT) Strategy for Targeted Treatment of EGFR-Overexpressing Cancers. *Mol. Pharmaceutics* 2012, 9, 2331–2338.
21. C.L. Modery-Pawłowski, L.L. Tian, V. Pan, KR McCrae, S Mitragotri, A. Sen Gupta. Approaches to synthetic platelet analogs. *Biomaterials*. 2013, 34(2):526-541.
22. A.M. Master, A. Sen Gupta. EGF receptor-targeted nanocarriers for enhanced cancer treatment. *Nanomedicine: Future Medicine* (Lond). 2012 Dec;7(12):1895-906
23. C.L. Modery-Pawłowski, L.L. Tian, M. Ravikumar, T.L. Wong, A. Sen Gupta. In vitro and in vivo hemostatic capabilities of a functionally integrated platelet-mimetic liposomal nanoconstruct. *Biomaterials*. 2013, 34(12):3031-41.
24. C.L. Modery-Pawłowski, A.M. Master, V. Pan, G.P. Howard, A. Sen Gupta. A platelet-mimetic paradigm for metastasis-targeted nanomedicine platforms. *Biomacromolecules*. 2013;14(3):910-919
25. C.L. Modery-Pawłowski, L.L. Tian, V. Pan, A. Sen Gupta. Synthetic Approaches to RBC Mimicry and Oxygen Carrier Systems. *Biomacromolecules*. 2013; 14(4): 939-948.
26. A.M. Master, M. Livingston, A. Sen Gupta. Photodynamic nanomedicine in the treatment of solid tumors: Perspectives and challenges. *J Control Release*. 2013; 168(1): 88-102.
27. A. M. Master, A. Malamas, R. Solanki, D. Liggett, J.L. Eiseman, A. Sen Gupta. A Cell-targeted Photodynamic Nanomedicine Strategy for Head-&-Neck Cancers. *Molecular Pharmaceutics*. 2013; 10(5): 1988-1997.
28. C.L. Modery-Pawłowski, K. Hsiaohsuan, W. Baldwin, A. Sen Gupta. A Platelet-inspired Paradigm for Nanomedicine Targeted to Multiple Diseases. *Nanomedicine: Future Medicine* (Lond). 2013; 8(10): 1709-1727.
29. C.L. Modery-Pawłowski, A Sen Gupta. Heteromultivalent Ligand-decoration for Actively Targeted nanomedicine. *Biomaterials* 2014; 35(9):2568-2579.
30. K.M. Kovach, J.R. Capadona, A. Sen Gupta, J.A. Potkay. The effects of PEG-based surface modification of PDMS microchannels on long-term hemocompatibility. *J Biomed Mater Res. Part A*. 2014; 102: 4195-4205.
31. H Haji-Valizadeh, C L Modery-Pawłowski, A Sen Gupta. An FVIII-derived Peptide Enables VWF-binding of a Synthetic Platelet Surrogate without Interfering with Natural Platelet Adhesion to VWF. *Nanoscale* 2014; 6: 4765-4773.
32. A Sen Gupta. Nanotechnology Applications in Diagnosis and Treatment of Metastasis. *Nanomedicine: Future Medicine* (Lond). 2014; 9: 1517-1529.
33. A. C. Anselmo, C.L. Modery-Pawłowski, S Menegatti, S Kumar, D.R. Vogus, L.L. Tian, M Chen, T.M. Squires, A Sen Gupta, S Mitragotri. Platelet-like nanoparticles: mimicking shape, flexibility and surface biology of platelets to target vascular injuries. *ACS Nano* 2014; 8(11): 11243-11253.
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35. K.M. Kovach, M.A. LaBarbera, M.C. Moyer, B.L. Cmolik, E. van Lunteren, A. Sen Gupta, J.R. Capadona, J.A. Potkay. In Vitro Evaluation and In Vivo Demonstration of a Biomimetic, Hemocompatible, Microfluidic Artificial Lung. *Lab on a Chip* 2015; 15(5): 1366-75.
36. A Sen Gupta. Cardiovascular Nanomedicine: Materials and Technologies. In: *Nanomaterials in Pharmacology*, Eds: Zheng-Rong Lu and Shinji Sakuma, Springer (2015).
37. A Sen Gupta. Biomaterials based Strategies in Blood Substitutes. In: *Biomaterials and Regenerative Medicine*. Ed: Laura Santambrogio, Springer (2015).
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39. A. Sen Gupta, M. Ravikumar. Synthetic Platelets. Patents *US 9107845* and *US 9636383*

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41. W Li, M Nieman, A Sen Gupta. Ferric chloride-induced murine thrombosis models. *JoVE*54479R2. Accepted, May 2016.
42. C Pawlowski, UDS Sekhon, V Betapudi, M Shukla, K Mccrae, A Sen Gupta. Synthetic platelet (SynthoPlate) technology enhances hemostasis in both prophylactic and emergency administration in mouse models of bleeding. *Front. Bioeng. Biotechnol.* Conference Abstract: 10th World Biomaterials Congress. 2016. doi: 10.3389/conf.FBIOE.2016.01.01153
43. M Shukla M, U Sekhon , V Betapudi, W Li, DA Hickman, CL Pawlowski, MR Dyer, MD Neal, KR McCrae, A Sen Gupta. In vitro characterization of SynthoPlate® (synthetic platelet) technology and its in vivo evaluation in severely thrombocytopenic mice. *J. Thromb. Haemost.* 2017; 15: 375-387.
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45. A Sen Gupta. Bio-inspired nanomedicine strategies for artificial blood components. *WIREs Nanomedicine and Nanobiotechnology.* 2017. WNAN1464 DOI: 10.1002/wnan.1464
46. U Sekhon, A Sen Gupta. Platelets and Platelet-inspired Biomaterials Technologies in Wound-healing Applications. *ACS Biomaterials Science* (Accepted May 2017).
47. M. Dyer, S. Haldeman, A. Gutierrez, L. Kohut, A. Sen Gupta, M.D. Neal. Uncontrolled Hemorrhagic Shock Modeled via Liver Laceration in Mice with Real Time Hemodynamic Monitoring. *J. Vis. Exp.* (123), e55554, doi: 10.3791/55554 (2017).
48. D. Maji, M.A. Suster, E. Kucukal, U.D.S. Sekhon, A. Sen Gupta, U.A. Gurkan, E.X. Stavrou, P Mohseni. ClotChip: A Microfluidic Dielectric Sensor for Point-of-Care Assessment of Hemostasis. *IEEE Trans Biomed Circuits Syst.* doi: 10.1109/TBCAS.2017.2739724. (2017). [Epub ahead of print].
49. A. Sen Gupta. 2017 Military Supplement: Hemoglobin-based Oxygen Carriers: Current State-of-the-Art and Novel Molecules. *Shock.* doi: 10.1097/SHK.0000000000001009. (2017) [Epub ahead of print].
50. D.A. Hickman, C.L. Pawlowski, U.D.S. Sekhon, J. Marks, A. Sen Gupta. Biomaterials and Advanced Technologies for Hemostatic Management of Bleeding. *Adv Mater.* doi: 10.1002/adma.201700859. (2017) [Epub ahead of print].
51. E.X. Stavrou, C. Fang, K.L. Bane, A.T. Long, C. Naudin, E. Kucukal, A. Gandhi, A. Brett-Morris, M.M. Mumaw, S. Izadmehr, A. Merkulova, C.C. Reynolds, O. Alhalabi, L. Nayak, W.M. Yu, C.K. Qu, H.J. Meyerson, G.R. Dubyak, U.A. Gurkan, M.T. Nieman, A. Sen Gupta, T. Renné, A.H. Schmaier. Factor XII and uPAR upregulate neutrophil functions to influence wound healing. *J Clin Invest.* 2018;128(3):944-959.
52. D.A. Hickman, C.L. Pawlowski, A. Shevitz, N.F. Luc, A. Kim, A. Girish, J. Marks, S. Ganjoo, S. Huang, E. Niedoba, U.D.S. Sekhon, M. Sun, M. Dyer, M.D. Neal, V.S. Kashyap, A. Sen Gupta. Intravenous synthetic platelet (SynthoPlate) nanoconstructs reduce bleeding and improve 'golden hour' survival in a porcine model of traumatic arterial hemorrhage. *Sci Rep.* 2018 Feb 15;8(1):3118. doi: 10.1038/s41598-018-21384-z.
53. M.R. Dyer, D. Hickman, N. Luc, S. Haldeman, P. Loughran, C. Pawlowski, A. Sen Gupta, M.D. Neal. Intravenous administration of synthetic platelets (SynthoPlate) in a mouse liver injury model of uncontrolled hemorrhage improves hemostasis. *J Trauma Acute Care Surg.* 2018;84(6): 917-923.
54. D. Maji, M. De La Fuente, E. Kucukal, U.D.S. Sekhon, A.H. Schmaier, A. Sen Gupta, U.A. Gurkan, M.T. Nieman, E.X. Stavrou, P. Mohseni, M.A. Suster. Assessment of Whole Blood Coagulation with a Microfluidic Dielectric Sensor. *J Thromb Haemost.* 2018 Jul 14. doi: 10.1111/jth.14244. [Epub ahead of print].
55. M. Cooley, A. Sarode, M. Hoore, D.A. Fedosov, S. Mitragotri, A. Sen Gupta. Influence of particle size and shape on their margination and wall-adhesion: implications in drug delivery vehicle design across nano-to-micro scale. *Nanoscale.* 2018 Aug 6. doi: 10.1039/c8nr04042g. [Epub ahead of print].
56. D. Maji, L. Nayak, J. Martin, U. D. S. Sekhon, A. Sen Gupta, P. Mohseni, M. A. Suster, S. P. Ahuja. A Novel, Point-of-Care, Whole-Blood Assay Utilizing Dielectric Spectroscopy is Sensitive to Coagulation Factor Replacement Therapy in Hemophilia A Patients. *Hemophilia.* 2019, DOI: 10.1111/hae.13799.

57. R. Lee, M.D. Neal, A. Sen Gupta. Pass Interference: Getting in the way of Platelets. Neighborhood Watch Article. *J Thromb Haemost.* 2019 (just accepted).
58. A. Girish, D. A. Hickman, A. Banerjee, N. Luc, Y. Ma, K. Miyazawa, U. D. S. Sekhon, M. Sun, S. Huang, A Sen Gupta. Trauma-targeted Delivery of Tranexamic Acid Improves Hemostasis and Survival in Rat Liver Hemorrhage Model. *J Thromb Haemost.* 2019; 17: 1632-1644. (Journal Cover Awarded).
59. A. Girish, U. Sekhon, A. Sen Gupta. Bioinspired artificial platelets for transfusion applications in traumatic hemorrhage. *Transfusion* 2020; 60: 229.
60. M. Sun, A. Sen Gupta. Vascular Nanomedicine: Current Status, Opportunities and Challenges. *Seminars in Thrombosis and Hemostasis.* 2020; 46: 524-544.
61. Y. Gao, A. Sarode, N. Kokoroskos, A. Ukidve, Z. Zhao, S. Guo, R. Flaumenhaft, A. Sen Gupta, N. Saillant, S.Mitragotri. A polymer based systemic hemostatic agent. *Science Advances.* 2020; 6: eaba0588
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66. U.D.S. Sekhon, K. Swingle, A. Girish, N. Luc, M. de la Fuente, J. Alvikas, S. Haldeman, A. Hassoune, K. Shah, Y. Kim, S. Eppell, J. Capadona, A. Shoffstall, M. D. Neal, W. Li, M. Nieman, A. Sen Gupta. Platelet-mimicking procoagulant nanoparticles augment hemostasis in animal models of bleeding. *Sci Trans Med* 2022; 14: eabb8975.
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69. P.H. Sloos, P. Vulliamy, C. van't Veer, A. Sen Gupta, M.D. Neal, K. Brohi, N.P. Juffermans, D.J.B. Kleinveld. Platelet dysfunction after trauma: From mechanisms to targeted treatment. *Transfusion* 2022; 62: S281-S300.
70. M.A. Cruz, D. Bohinc, E.A. Andraska, J. Alvikas, S. Raghunathan, N.A. Masters, N.D. van Kleef, K.L. Bane, K. Hart, K. Medrow, M. Sun, H. Liu, S. Haldeman, A. Bannerjee, E.M. Lessieur, K. Hageman, A. Gandhi, M. de la Fuente, M.T. Nieman, T.S. Kern, C. Maas, S. de Maat, K.B. Neeves, M.D. Neal, A. Sen Gupta, E.X. Stavrou. Nanomedicine platform for targeting neutrophils and neutrophil-platelet complexes using an  $\alpha$ 1-antitrypsin-derived peptide motif. *Nature Nanotech* 2022; 1-11.
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- A.E. Sloan. Glioma cells activate platelets by plasma-independent thrombin production to promote glioblastoma tumorigenesis. *Neurooncology Adv.* 2022; 4: vdac172.
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  76. M. Sun, M. Hao Hao Pontius, S. Yang, T. Pendekanti, S. Raghunathan, J.A. Shavit, A. Sen Gupta. Direct delivery of plasmin using clot-anchoring thrombin-responsive nanoparticles for targeted fibrinolytic therapy. *J Thromb. Haemost.* (just accepted).
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  78. D.V. Lam, A. Javadekar, N. Patil, M. Yu, L. Li, D.M. Menendez, A. Sen Gupta, J.R. Capadona, A.J. Shoffstall. Platelets and hemostatic proteins are co-localized with chronic neuroinflammation surrounding implanted intracortical microelectrodes. *Acta Biomater.* 2023; 166: 278-290.
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  80. A.J. Srinivasan, Z.A. Secunda, R.I. Mota-Alvidrez, N.F. Luc, D. Disharoon, B. Traylor, C.L. Pawlowski, J.B. Brown, M. A. Bruckman, A. Sen Gupta, M.D. Neal. Platelet-inspired synthetic nanoparticles improve hemostasis and hemodynamics in a rabbit model of abdominal hemorrhage. *J. Trauma Acute Care Surg.* 2024; 96: 101-108.

A full list of publication can be accessed at Google Scholar link:

<https://scholar.google.com/citations?user=4PuGF3gAAAAJ&hl=en>

## BOOK CHAPTERS

1. P N Shah, J A Smolen, **A Sen Gupta**, Y H Yun. Electrospun Pseudo Poly(Amino Acids) for Tissue Engineering Applications. In: *Nanotechnology in Tissue Engineering and Regenerative Medicine*, Ed: Ketul Popat, CRC Press, Taylor and Francis, 2011.
2. **A Sen Gupta**, H von Recum. Bioconjugation Strategies: Lipids, Liposomes, Polymerosomes and Microbubbles. In: *Chemistry of Bioconjugates: Synthesis, Characterization, and Biomedical Applications*, Wiley-Blackwell, (2014).
3. **A Sen Gupta**. Cardiovascular Nanomedicine: Materials and Technologies. In: *Nanomaterials in Pharmacology*, Eds: Zheng-Rong Lu and Shinji Sakuma, Springer (2015).
4. **A Sen Gupta**. Biomaterials based Strategies in Blood Substitutes. In: *Biomaterials and Regenerative Medicine*. Ed: Laura Santambrogio, Springer (2015).
5. **A. Sen Gupta**, A. Doctor. Oxygen Carriers. In: *Damage Control Resuscitation*, Ed: Philip Spinella, Springer (2020).
6. **A. Sen Gupta**. Synthetic Blood Substitutes. In: *Trauma Induced Coagulopathy*. Eds: Moore, Neal, Moore, Springer (2021).

## GRANTS AWARDED

### Completed Support

1. Ohio Board of Regents Sen Gupta (PI) 07/2007-06/2009  
Case Presidential Research Initiative 2007 Total direct: \$75,000  
**Hemostatically active liposomes as synthetic platelet substitutes**
2. NOAIRC Pilot Project under NIH-NCI (Duerk, Jeffery L, Director) Sen Gupta (PI) 9/2006 – 8/2009  
Case Comprehensive Cancer Center pilot project Total Direct: \$30,000  
**SPECT Imaging for Liposome Biodistribution in a Mouse Model**
3. NIH SBIR Phase I (Shuwu Wang, Nanomimetics, PI) Sen Gupta (consultant) 09/2005-08/2008



- Consulting fee of \$2000 per year
- Platelet Liposomal Drug Delivery ---- Thrombosis/Restenosis***
4. NIH SBIR Phase I (David Vachon, Aegis Biosciences, PI; Sen Gupta (Co-I) 12/2007-08/2009  
Total sub-contract to Sen Gupta: \$38,524
- Peptide-Modified Sulfonated Styrene Block Copolymers for Vascular Applications***
5. AHA Beginning Grant-in-Aid Sen Gupta (PI) 07/2007 –06/2010  
Total direct: \$121,000
- Functionally Integrated Liposomes as Synthetic Platelet Substitutes***
6. NIH SBIR Phase I (Shuwu Wang, Nanomimetics, PI) Sen Gupta (Co-I) 04/2010-06/2011  
Total subcontract to Sen Gupta: \$32,970
- Fluorosurfactant polymers for vascular interface applications***
7. CCTIP Coulter Pilot Funding Sen Gupta (PI) 01/2010 – 06/2010  
Total direct: \$30,000
- In Vitro Analysis of Synthetic Platelet Substitute in a Dynamic Shear Flow Environment***
8. NIH SBIR Phase I (Vachon PI, IASIS Molecular) Sen Gupta (Co-I) 06/ 2010 – 08/2013  
Total sub-contract to Sen Gupta: \$37,123
- A Novel Electrospun Vascular Graft***
9. Case Comprehensive Cancer Center ACS IRG Pilot Grant Sen Gupta (PI) 07/2013 - 06/2014  
Total direct: \$30,000
- A Platelet-inspired Nanomedicine Platform for Metastasis-targeted Drug Delivery***
10. VA Merit Award Application Sen Gupta (Co-I) 04/2011 – 03/2015  
Total sub-contract to Sen Gupta: \$45,574 per year
- In vivo performance of a high efficiency microfabricated artificial lung***
11. NCAI-CC Sen Gupta (PI) 09/2015 - 08/2016  
Total direct: \$125,000
- Evaluation of SynthoPlate Technology in Porcine Model of Traumatic Bleeding***
12. Case-Coulter Translational Research Program Sen Gupta (PI) 09/2015 – 08/2016  
Total Direct: \$125,000
- Evaluation of SynthoPlate Technology in Treating Hemorrhagic Trauma*** (Match for NCAI grant)
13. Ohio Technology Validation Start-up Fund (TVSF) Sen Gupta (PI) 02/01/2016-07/31/2017  
Total direct: \$50,000
- SynthoPlate Technology Scale Up and Validation***
14. AHA Grant in Aid Sen Gupta (Co-I) 07/01/2017 – 06/30/2019  
Total: \$121,000
- A Dielectric Microsensor for Comprehensive Assessment of Blood Coagulation at the Point-of- Care***
15. Case Council to Advance Human Health (CAHH) Sen Gupta (PI) 09/01/2017 – 05/31/2019  
Total: \$75,000
- Pharmacology and Toxicology Analysis of Synthetic Platelet Nanoparticles in Rats***
16. NSF SBIR Phase I Sen Gupta (Co-I) December 2017- May 2019  
Total: \$225,000
- Manufacturing and Characterization of a Synthetic Platelet (SynthoPlate™) Technology***
17. DoD SBIR Phase I Sen Gupta (Co-I) 10/01/2018-09/30/2019  
Total : \$150,000
- Logistical and Functional Evaluation of SynthoPlate™ (Intravenous Synthetic Platelet) Technology for Pre-Hospital Hemorrhage Control***
18. NIH R01 HL129179 Sen Gupta (PI) 09/01/2015 – 04/30/2021  
Total: \$2 M
- Platelet-inspired Delivery System for Targeted Thrombolytic Therapy***
19. DoD, DMRDP PFCRA Research Award Sen Gupta (PI) 08/01/2017- 07/31/2022  
Total: \$1 M
- SynthoPlate® Nanotechnology For Intravenous Hemostasis and Wound Healing in Prolonged Field Care***
20. VA Merit Award Sen Gupta (Co-I) 10/01/2019 – 09/30/2023



Total: \$650,000

***Treatment of Deep Vein Thrombosis via Targeted Inhibition of FXII-uPAR-pAkt2 Axis in Neutrophils***

21. DoD, CRRP Program Sen Gupta (Co-I) 08/2020-07/2023

Total: \$2 M

***A Field-Deployable Dielectric Coagulometer for Point-of-Care Assessment of Trauma-Induced Coagulopathy***

22. NIH R01 HL137695 Sen Gupta (Co-I) 01/01/2019-12/31/2023

Total: \$1.8 M

***Targeted Abrogation of the FXII-uPAR-pAkt2 Axis in Neutrophils for Treatment of Chronic Wounds***

23. NIH R01 HL141080 Sen Gupta (MPI) 04/2019-03/2024

Total: \$3.8 M

***Mechanisms of platelet exosome-mediated acute chest syndrome in sickle cell disease***

**Current Support**

1. NIH R01 HL121212 Sen Gupta (PI) 02/2020 – 01/2025

Total: \$4.2 M

***Heteromultivalent Peptide-Lipid Nanoconstructs as Artificial Platelet Analogs***

2. DoD, PRMRP Technology Development Award Sen Gupta (PI) 07/2020- 06/2024

Total: \$3 M

***Field-Deployable Dried Platelet Surrogate Nanotechnology for Hemorrhage Control in RDCR***

3. DoD, PRMRP IIRA Program Sen Gupta (Co-I) 09/2021- 08/2024

Total: \$2.4 M

***TraumaChek<sup>TM</sup>: A Field-deployable Dielectric Coagulometer for Comprehensive Hemostatic Assessment in Remote Damage Control Resuscitation (RDCR)***

4. DoD, PRMRP IIRA Program Sen Gupta (PI) 09/2022- 08/2026

Total: \$2.4 M

***SanguiStop: Intravenous Nanomedicine for Targeted Thrombin Delivery in Hemorrhage Control***

5. DARPA FSHARP Contract Sen Gupta (Domain Lead at CWRU) 12/2022 – 11/2026

Total: \$46 M (CWRU Subcontract \$4.5M)

***CONCERT: Consortium for Optimized Integration of Bioartificial Blood Components for Adaptive Resuscitation and Therapy***

6. DoD, PRMRP IIRA Program Sen Gupta (PI) 07/2024- 08/2028

Total: \$2.75 M

***HemoSeal: Combinatorial Nanoparticle Technology for Point-of-Injury Hemorrhage Control***

**SYNERGISTIC ACTIVITIES**

- Member and researcher at *Case Comprehensive Cancer Center*. <http://cancer.case.edu>.
- Inventor, Co-founder and Board Member: [Haima Therapeutics](#). Biotech startup to translate technologies for transfusion medicine.