DAVID H. KOCH PROFESSOR AND EXECUTIVE OFFICER
DEPARTMENT OF CHEMICAL ENGINEERING
KOCH INSTITUTE FOR INTEGRATIVE CANCER RESEARCH
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Chemical Engineering
Massachusetts Institute of Technology
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EDUCATION:

Harvard University Cambridge, MA
Postdoctoral Fellow, September 1993 - January 1995
Advisor: G. M. Whitesides, Chemistry Department

Massachusetts Institute of Technology Cambridge, MA
Ph.D., Chemical Engineering, June 1993
Program in Polymer Science and Technology Fellow, 1988-89
Thesis Title: The Synthesis, Characterization and Optical Properties of Novel Diacetylene-Containing Aromatic Liquid Crystalline Polymers.
Advisor: M. F. Rubner, Dept. of Materials Science and Engineering

Georgia Institute of Technology Atlanta, GA
M.S.,Chemical Engineering, August 1988
Thesis Title: Development of a Conductive Elastomeric Matrix for Robotic Tactile Sensors.
Advisors: A.S. Abhiraman, J.W. Gooch

Massachusetts Institute of Technology Cambridge, MA
B.S., Chemical Engineering, June 1984.

ACADEMIC POSITIONS:

Massachusetts Institute of Technology

David H. Koch Professor of Engineering Chair	2011 - present
Executive Officer, Department of Chemical Engineering	2008 - 2012
Full Professor, Bayer Chair Professorship	2006 - present
Mark Hyman, Jr. Associate Chair Professor	2003 - 2006
Associate Professor with Tenure	2002 - 2006
Joseph P. Mares Associate Chair Professor of Chemical Engineering	2000 - 2003
Associate Professor of Chemical Engineering	2000 - 2002
Herman P. Meissner Career Development Assistant Professor,	1995 - 2000

HONORS

- Fellow of American Academy of Arts and Sciences, 2013
- DoD Ovarian Cancer Teal Innovator Award, 2013
- Charles M.A. Stine Award, AIChE, 2013
- Board of Directors, American Institute of Chemical Engineers (AIChE)
- Fellow, American Chemical Society Polymer Chemistry Division, 2012
- Margaret Etters Lecturer in Chemistry, University of Minnesota, 2013
- David H. Koch Chair Professor of Engineering, 2011 - present
- Top 100 Materials Scientists 2000-2010, top cited as rated by Thomson-Reuters
- Dow Foundation Distinguished Lecturer, University of California, Santa Barbara, 2010
- Distinguished Scientist Award, Harvard Foundation, Harvard University, 2010
- Melvin Calvin Lecturer, U.C. Berkeley Department of Chemistry, 2009
- Visiting Women's Scholar Award, University of Delaware, 2009
- William W. Grimes Award, AIChE, 2009
- Caltech Kavli Institute Lecturer, February 2009
- Fellow, American Institute of Medical and Biological Engineering (AIMBE), Elected 2009

- Visiting Women's Scholar Award, University of Delaware, 2009
- Bayer Chair Professorship, 2006-2010
- Karl Kammermeyer Distinguished Lecture at Iowa State University, 2008
- Irwin Sizer Award for Significant Improvements to MIT Education, 2008
- Featured in "Top 100 Science Stories of 2008", Discover Magazine, January 2009 for micropatterned virus batteries
- Featured in Nature, The Economist, Forbes and Technology Review for methanol fuel cell PEM from polyelectrolyte multilayer nano-assembly (*Advanced Materials* 2008).
- Lucy Pickett Lecturer, Mt. Holyoke College, 2007
- Popular Mechanics Breakthrough Award (honors 10 innovations in science and technology) for Virus-Base Thin Film Battery, October 2006
- Member, National Research Council (NRC) Board on Chemical Sciences and Technology (invited appointee) 2006-2009
- Permanent Member, NIH Gene and Drug Delivery Study Group, 2006-2010
- Georgia Tech Outstanding Young Alumni Award, 2004
- Bayer Distinguished Lecturer, 2004
- Radcliffe Institute Fellow (aka Bunting Fellow), Harvard University, 2003
- Mark Hyman, Jr. Associate Professor Career Chair
- Henry Hill Lecturer Award, NOBCChE, 2004
- Joseph R. Mares Associate Professor Chair
- Junior Bose Faculty Award, 2000
- GenCorp Signature University Award 2000
- Lloyd Ferguson Young Scientist Award, 2000
- Invited Attendee, National Academy of Engineering Frontiers of Engineering Symposium
- NSF CAREER Award for Young Investigators, 1997
- Environmental Protection Agency Early Career Research Award, 1996
- 3M Innovation Research Award, 1996
- DuPont Young Faculty Research Award, 1996-1999
- Herman P. Meissner Career Development Chair 1995-1998
- NSF Postdoctoral Fellowship in Chemistry, 1994
- Ford Foundation Dissertation Fellowship, 1992
- Massachusetts Institute of Technology Karl Taylor Compton Prize Recipient, 1992
- Eastman Kodak Theophilus Sorrel Graduate Award Recipient, NOBCChE, 1990

ADDITIONAL EXPERIENCE:

Harvard University Cambridge, MA

Postdoctoral Fellow

September, 1993-January, 1995

NSF Postdoctoral Fellow in Chemistry, 1994

Postdoctoral studies with George M. Whitesides of the Harvard Chemistry Department. Used patterned self-assembled monolayers on gold to guide the deposition of metals, polymers, organic and inorganic dyes. Stamped micron scale features onto gold surfaces using alkanethiols. The monolayers served as templates or resists for the deposition of a wide range of materials in the production of microstructures.

Massachusetts Institute of Technology Cambridge, MA

Research Assistant

June 1989 - June 1993

Research Experience:

Projects included extensive research of diacetylene-containing polyurethanes; synthesized polyurethanes an measured mechanical and optical properties such as mechanochromism as a function of degree of cross polymerization of diacetylene groups. Designed and synthesized a series of main chain thermotropic liqui crystalline aromatic polyesters containing the diacetylene group within the main chain repeat unit.

Research Engineer I
August, 1986 - August, 1988

Motorola, Inc. Ft.Lauderdale, FL
Process Engineer I, II
July, 1984 - June, 1986

Dow Chemical Company Midland, MI
Summer Intern
Summer, 1983

RESEARCH INTERESTS

- Alternating Electrostatic Layer-by-Layer Assembly
- Macromolecular Design and Synthesis
- Self-organizing Polymer Systems
- Polymeric Biomaterials
- Synthetic Polypeptides
- Dendrimers and Dendritic Block Copolymers

PROFESSIONAL SOCIETIES:

Member of the American Institute of Chemical Engineers (AICHE), the American Chemical Society (ACS), the American Physical Society (APS), the Materials Research Society (MRS), Sigma Xi and the National Organization for the Advancement of Blacks in Chemistry and Chemical Engineering (NOBCChE), Society of Biological Engineers (SBE), American Institute of Biomedical and Biological Engineers (AIMBE).

PROFESSIONAL SERVICE:

Associate Editor, ACS Nano	2007-present
Member, Board of Directors, AIChE	2012-2015
Editorial Advisory Board, Macromolecules	2009-present
Co-Author, NSF Report on Biomaterials	2013
Co-author, NSF Report on Polymer Science	2007
University of Wisconsin NSF MRSEC Advisory Board	2013-2016
Member, NRC Board on Chemical Science and Technology (BCST)	2006-2010
NIH Gene and Drug Delivery Study Section	2006-2010
Chair, AIChE MESD	2007-2008
Chair, Polymer Group, AIChE,	2000-2001
Advisory Editorial Board, *Soft Matter*	2005-2008
MRS Fall Meeting Chair,	2003
Advisory Board, *Chemistry of Materials*	2002-2007
Advisory Board, *Advanced Materials*	1997-2007

PUBLICATIONS:

Papers:

1. M.A. Quadir, M.Martin, P.T. Hammond, "Clickable Synthetic Polypeptides – Routes to New Highly Adaptive Biomaterials", *Chemisty of Materials, in press.*

2. W.Li, S. Lee, M. Ma, S. M. Kim, P. Guye, J. Pancoast, D.G Anderson, R. Weiss, R.T. Lee, and P.T. Hammond, "Microbead-based *biomimetic* synthetic neighbors enhance survival and function of rat pancreatic β-cells", *Scientific Reports*, *in press*.

3. S.W. Morton, N.J. Shah, M.A. Quadir, Z.J. Deng, Z. Poon, and P.T. Hammond, "Osteotropic therapy via targeted Layer-by-Layer nanoparticles", *Advanced Healthcare Materials*, *in press*.

4. N. J. Shah, M. N. Hyder, J. S. Moskowitz, M. A. Quadir, S. W. Morton, H. J. Seeherman, R. F. Padera, M. Spector, P. T. Hammond, "Surface-mediated bone tissue morphogenesis from tunable nanolayered implant coatings", *Science Translational Medicine* **5**, 191ra83 (2013) (cover).

5. S.W. Morton, K.P. Herlihy, K.E. Shopsowitz, Z.J. Deng, K.S. Chu, C.J. Bowerman, J.M. Desimone, and P.T. Hammond, "Scalable Manufacture of Built-to-Order Nanomedicine: Spray-Assisted Layer-by-Layer Functionalization of PRINT Nanoparticles", *Advanced Materials*, **25**, 4706 (2013).

6. E.A. Cho, F.J. Moloney, H. Cai, A. Au-Yeung, C. China, R.A. Scolyer, B. Yosufi, M.J. Raftery, J.Z. Deng, S.W. Morton, P.T. Hammond, H.T. Arkenau, D.L. Damian, D.J. Francis, C.N. Chesterman, R.S.C. Barnetson, G.M. Halliday, L.M. Khachigian, "Safety and tolerability of an intratumorally injected DNAzyme, Dz13, in patients with nodular basal-cell carcinoma: a phase 1 first-in-human trial (DISCOVER)", *The Lancet*, in press, doi: 10.1016/S0140-6736(12)62166-7 (2013).

7. P.Y. Chen, R. Ladewski, R. Miller, X. Dang, J. Qi, F. Liau, A.M. Belcher and P.T. Hammond, "Layer-by-Layer Assembled Porous Photoanodes for Efficient Electron Collection in Dye-Sensitized Solar Cells" Journal of Materials Chemistry A, **1 (6),** 2217-2224, (2013).

8. S.W. Morton, Z. Poon, P.T. Hammond, "The Architecture and Biological Performance of LbL Nanoparticles," Biomaterials, **34 (21)**: 5328-5335, (2013).

9. S.C. Castleberry, M.X. Wang, P.T. Hammond, "Nano-Layered siRNA Dressing for Sustained Localized Knockdown", *ACS Nano*, **7**, 5251-61, (2013).

10. D.S. Liu, J.N. Ashcraft, M.M. Mannarino, M.N. Silberstein, A.A. Argun, G. C. Rutledge, M.C. Boyce and P.T. Hammond, "Spray Layer-by-Layer Electrospun Composite Proton Exchange Membranes", *Adv Funct Mater,* doi: 10.1002/adfm.201202892, (2013)

11. D.K. Bonner, X. Zhao, H. Buss, R. Langer, P.T. Hammond, "Crosslinked linear polyethylenimine enhances delivery of DNA to the cytoplasm", *Journal of Controlled Release, in press,* doi: 10.1016/j.jconrel.2012.09.004, (2013).

12. M. Petr, M.E. Helgeson, J. Soulages, G.H. McKinley, P.T. Hammond, "Rapid viscoelastic switching of an ambient temperature range photo-responsive azobenzene side chain liquid crystal polymer", *Polymer, **54***, 2850-2856, (2013).

13. M. Petr, B. Katzman, W. DiNatale, P.T. Hammond, "Synthesis of a new, low-Tg siloxane thermoplastic elastomer with a functionalizable backbone and its use as a rapid, room temperature photoactuator", *Macromolecules,* **46**, 2823-2832, (2013).

14. P. C. DeMuth, Y. Min, B. Huang, A. Miller, J. Kramer, D. H. Barouch, P. T. Hammond, and D. J. Irvine, Polymer multilayer tattooing for enhanced DNA vaccination. Nature Materials, **12**, 367-376, (2013).

15. P.C. DeMuth, W.F. Garcia-Beltran, M.L. Ai-Ling, P.T. Hammond, D.J. Irvine, "Composite dissolving microneedles for coordinated control of antigen and adjuvant delivery kinetics in transcutaneous vaccination", *Adv Funct Mater,* **23**, 161-172, (2013).

16. X. Dang, J. Qi, M.T. Klug, P.Y. Chen, D.S. Yun, N.X. Fang, P.T. Hammond, A.M. Belcher. "Tunable localized surface plasmon-enabled broadband light-harvesting enhancement for high-efficiency panchromatic dye-sensitized solar cells", *Nano Letters,* (2012).

17. S.Y. Kim, J. Hong, R. Kavian, S.W. Lee, M.N. Hyder, Y. Shao-Horn and P.T. Hammond, "Rapid fabrication of thick Spray-Layer-by-Layer carbon nanotube electrodes for high power and energy devices", *Energy and Environmental Science*, **6**, 888-897, (2013).

18. P.C. DeMuth, J.J. Moon, H. Suh, P.T. Hammond and D.J. Irvine, "Releasable Layer-by-Layer Assembly of Stabilized Lipid Nanocapsules on Microneedles for Enhanced Transcutaneous Vaccine Delivery", *ACS Nano*, **6**, 8041-8051, (2012).

19. A.M. Oelker, S.M. Morey, L.G. Griffith, and P.T. Hammond, "Helix Versus Coil Polypeptide Macromers: Gel Networks with Decoupled Stiffness and Permeability", *Soft Matter*, **8**, 10887-10895, (2012).

20. P. Li, C. Zhou, S. Rayatpisheh, K. Ye, Y.F. Poon, P.T. Hammond, H.W. Duan, M.B. Chan-Park, "Cationic Peptidopolysaccharides Show Excellent Broad-Spectrum Antimicrobial Activities and High Selectivity", *Advanced Materials*, **24**, 4130-4137 (2012).

21. J. Liu, N.R. Davis, D.S. Liu, and P.T. Hammond, "Highly Transparent Mixed Electron and Proton Conducting Polymer Membranes", *Journal of Materials Chemistry*, **22**, 15534-15539, (2012).

Peptidopolysaccharides Show Excellent Broad-Spectrum Antimicrobial Activities and High Selectivity", *Advanced Materials*, **24**, 4130-4137 (2012).

23. C. M. Chopko, E.L. Lowden, A.C. Engler, L.G. Griffith, and P.T. Hammond, "Dual Responsiveness of a Tunable Thermosensitive Polypeptide", *ACS Macro Lett.*, **1**, 727–731 (2012).

24. E. Costa, M. M. Lloyd, C. Chopko, A. Aguiar-Ricardo, and P.T. Hammond, "Tuning Smart Microgel Swelling and Responsive Behavior through Strong and Weak Polyelectrolyte Pair Assembly", *Langmuir*, **28**, 10082–10090 (2012).

25. P.T. Hammond, "Building biomedical materials layer-by-layer", *Materials Today*, **15**, 196-206 (2012).

26. P.T. Hammond, "Polyelectrolyte multilayered nanoparticles: using nanolayers for controlled and targeted systemic release", *Nanomedicine*, **7**, 619-622 (2012).

27. X. Zhao, Z. Poon, A.C. Engler, D.K. Bonner, and P.T. Hammond, "Enhanced Stability of Polymeric Micelles Based on Postfunctionalized Poly(ethylene glycol)-b-poly(gamma-propargyl L-glutamate): The Substituent Effect", *Biomacromolecules*, **13**, 1315-1322 (2012).

28. J.B. Lee, J. Hong, D. K. Bonner, Z. Poon, P. T. Hammond, "Self-assembled RNA Interference microsponges for efficient siRNA delivery", *Nature Materials*, **11**, 316–322 (2012). *(This paper was selected by the Faculty of 1000 (F1000))*

29. A. Shukla, S. Puranam, P.T Hammond, "Vancomycin storage stability in multilayer thin film coatings for on-demand care", *Journal of Biomaterials Science-Polymer Edition,* **23***,* 1895-1902 (2012).

30. F. Fadhillah, S.M.J. Zaidi, Z. Khan, M. Khaled, F. Rahman, P.T. Hammond, "Development of multilayer polyelectrolyte thin-film membranes fabricated by spin assisted layer-by-layer assembly", *Journal of Applied Polymer Science*, **126**, 1468-1474, (2012).

31. J. Hong, N.J. Shah, A.C. Drake, P.C. DeMuth, J.B. Lee, J. Chen, and P.T. Hammond, "Graphene Multilayers as Gates for Multi-Week Sequential Release of Proteins from Surfaces", *ACS Nano*, **6**, 81-88 (2012).

32. N.J. Shah, J. Hong, M.N. Hyder and P.T. Hammond, "Osteophilic Multilayer Coatings for Accelerated Bone Tissue Growth", *Advanced Materials,* **24**, 1445-1450 (2012).

33. S.Y. Wong, L. Han, K. Timachova, J. Veselinovic, M.N. Hyder, C. Ortiz, A.M. Klibanov, and P.T. Hammond, "Drastically Lowered Protein Adsorption on Microbicidal Hydrophobic/Hydrophilic Polyelectrolyte Multilayers", *Biomacromolecules* **13**, 719-726, (2012).

34. A. Shukla, J. C. Fang, S, Puranam, F. Jensen, and P. T. Hammond, "Hemostatic Multilayer Coatings", *Advanced Materials,* **24**, 492 (2012).

35. A. Shukla, J.C. Fang, S. Puranam, P.T. Hammond, "Release of vancomycin from multilayer coated absorbent gelatin sponges", *Journal of Controlled Release*, **157**, 64-71, (2012).

36. P.T. Hammond, "Engineering Materials Layer-by-Layer: Challenges and Opportunities in Multilayer Assembly" *AIChE Journal*, **57**, 2928-2940 (2011).

37. Y. Min and P.T. Hammond, "Catechol-Modified Polyions in Layer-by-Layer Assembly to Enhance Stability and Sustain Release of Biomolecules: A Bioinspired Approach", *Chemistry of Materials*, **23**, 5349-5357 (2011).

38. D. Bonner, C. Leung, J. Chen-Liang, L. Chingozha, R. Langer, P.T. Hammond, "Intracellular Trafficking of Linear-Dendritic Block Copolymers", *Bioconjugate Chemistry*. 22, 1519-1525 (2011).

39. M.N. Hyder, S.W. Lee, F.C. Cebeci, D.J. Schmidt, Y. Shao-Horn, P.T. Hammond, "Layer-by-Layer Assembled Polyaniline Nanofiber/Multiwall Carbon Nanotube Thin Film Electrodes for High-Power and High-Energy Storage Applications", *ACS Nano*, **5**, 8552-8561 *(2011).*

40. M. Petr, P.T. Hammond, "Room Temperature Rapid Photoresponsive Azobenzene Side Chain Liquid Crystal Polymer" *Macromolecules*, **44**, 8880-8885 (2011).

41. Z. Poon, J.B. Lee, S.W. Morton and P.T Hammond, "Controlling *In vivo* Stability and Biodistribution in Electrostatically Assembled Nanoparticles for Systemic Delivery", *Nano Letters*, **11**, 2096-2103 (2011).

42. Z. Poon, D. Chang, X. Zhao, and P.T. Hammond, "Layer-by-Layer Nanoparticles with a pH-Sheddable Layer for in Vivo Targeting of Tumor Hypoxia", *ACS Nano*, **5**, 4284–4292 (2011).

43. N.J. Shah, M.L. Macdonald, Y.M. Beben, R. Padera, R.E. Samuel and P.T. Hammond, "Tunable Dual Growth Factor Delivery from Polyelectrolyte Multilayer Films", *Biomaterials,* 32, 6183-6193 (2011).

44. R.E. Samuel, A. Shukla, D. H. Paik, M.X. Wang, J.C. Fang, D.J. Schmidt, P.T. Hammond, "Osteoconductive protamine-based polyelectrolyte multilayer functionalized surfaces", *Biomaterials*, **32,** 7491-7502 (2011).

45. D.J. Schmidt, Y. Min and Paula T. Hammond, "Mechanomutable and reversibly swellable polyelectrolyte multilayer thin films controlled by electrochemically induced pH gradients", *Soft Matter*, **7**, 6637-6647 (2011).

46. A. Shukla, R.C. Fuller and P.T. Hammond, "Design of multi-drug release coatings targeting infection and inflammation", *Journal of Controlled Release*, **155**, 159-166 (2011)

47. A. C. Engler, D. K. Bonner, H. G. Buss, E.Y. Cheung, P.T. Hammond, "The Synthetic Tuning of Clickable pH Responsive Cationic Polypeptides and Block Copolypeptides", *Soft Matter*, **7**, 5627-5637 (2011).

48. J. Hong, B.S. Kim, K. Char and P.T. Hammond, "Inherent Charge-Shifting Polyelectrolyte Multilayer Blends: A Facile Route for Tunable Protein Release from Surfaces". *Biomacromolecules* **12**, 2975-2981, (2011).

49. B.G. Choi, J. Hong, Y.C. Park, D.H. Jung,; W.H. Hong; P.T. Hammond and H. Park, Innovative Polymer Nanocomposite Electrolytes: Nanoscale Manipulation of Ion Channels by Functionalized Graphenes. *ACS Nano*, **5**, 5167-5174 (2011).

50. A.B.E. Attia, Z.Y. Ong, J.L. Hedrick, P.P. Lee, P.L.R. Ee, P.T. Hammond, and Y.Y. Yang, Mixed micelles self-assembled from block copolymers for drug delivery. *Current Opinion in Colloid & Interface Science,* **16**, 182-194 (2011).

51. Qi, J. F., Dang, X. N., Hammond, P. T. & Belcher, A. M. "Highly Efficient Plasmon-Enhanced Dye-Sensitized Solar Cells through Metal@Oxide Core-Shell Nanostructure". *ACS Nano* **5**, 7108-7116, (2011).

52. A.C. Engler, A. Shukla, S. Puranam, H.G. Buss, N. Jreige, and P.T. Hammond, "Effects of Side Group Functionality and Molecular Weight on the Activity of Synthetic Antimicrobial Polypeptides". *Biomacromolecules* **12**, 1666-1674, (2011).

53. C.A. Nguyen, A.A. Argun, P.T. Hammond, X.H. Lu, X. H, P.S. Lee, "Layer-by-Layer Assembled Solid Polymer Electrolyte for Electrochromic Devices", *Chemistry of Materials* **23,** 2142-2149 (2011).

54. X. Dang, H.Yi1, M-H Ham, J. Qi, D. S. Yun, R. Ladewski, M.S. Strano, P.T. Hammond and A.M. Belcher, "Virus-templated self-assembled single-walled carbon nanotubes for highly efficient electron collection in photovoltaic devices", *Nature Nanotechnology*, **6**, 377-384 (2011).

55. S.W. Lee, B.M. Gallant, H.R. Byon, P.T. Hammond, and Y. Shao-Horn, "Nanostructured Carbon-Based Electrodes: Bridging the Gap between Thin-Film Lithium-ion Batteries and Electrochemical Capacitors", *Invited Perspective, Energy & Environmental Science,* **4**, 1972-1985 (2011).

56. B.B. Hsu, S.Y. Wong, P.T. Hammond, J.Z. Chen, A.M. Klibanov, "Mechanism of influenza virus inactivation by immobilized hydrophobic polycations", *Proc. Natl. Acad. Sci. U.S.A.*, **108**, 61-66 (2011).

57. B.B. Hsu, J. Ouyang, S.Y. Wong, P.T. Hammond A.M. Klibanov, "On structural damage incurred by bacteria upon exposure to hydrophobic polycationic polymers", *Biotechnol. Lett.,* **33**, 1605-1615 (2011).

58. E. Costa, M. Coelho, L. M. Ilharco, A. Aguiar-Ricardo, P.T. Hammond, "Tannic Acid Mediated Suppression of PNIPAAm Microgels Thermoresponsive Behavior", *Macromolecules*, **44**, 612-621 (2011).

59. H.R. Byon, S.W. Lee, S. Chen, P.T. Hammond, and Y. Shao-Horn, "Thin Flms of Carbon Nanotubes and Chemically Reduced Graphenes for Electrochemical Micro-capacitors", *Carbon*, **49**, 457-467 (2011).

Nanocarriers for Systemic Tumor Targeting", *Nanomedicine: Nanotechnology, Biology and Medicine,* **7**, 201-209 (2011).

61. S.Y. Wong, J.S. Moskowitz, J. Veselinovic, R.A. Rosario, K. Timachova, M.R. Blaisse, R.C. Fuller, A.M. Klibanov, and P.T. Hammond, "Dual Functional Polyelectrolyte Multilayer Coatings for Implants: Permanent Microbicidal Base with Controlled Release of Therapeutic Agents", *J. Am. Chem. Soc.*, **50**, 17840–17848 (2010).

62. M.L. Macdonald, R.E. Samuel, N. J. Shah, R.F. Padera, Y.M. Beben, P.T. Hammond, "Tissue integration of growth factor-eluting layer-by-layer polyelectrolyte multilayer coated implants", *Biomaterials*, **32**, 1446-1453 (2010).

63. D.J. Schmidt, P.T. Hammond, "Electrochemically erasable hydrogen-bonded thin films", *Chemical Communications*, **46**, 7358-7360 (2010).

64. D.J. Schmidt, J.S. Moskowitz, P.T. Hammond, "Electrically Triggered Release of a Small Molecule Drug from a Polyelectrolyte Multilayer Coating", *Chemistry of Materials*, **22**, 6416-6425 (2010).

65. P.C. DeMuth, X.F. Su, R.E. Samuel, P.T. Hammond, D.J. Irvine, "Nano-Layered Microneedles for Transcutaneous Delivery of Polymer Nanoparticles and Plasmid DNA", *Advanced Materials*, **22**, 4851-+ (2010).

66. P.T. Jia, A.A. Argun, J.W. Xu, S.X. Xiong, J. Ma, P.T. Hammond, X.H. Lu, "High-Contrast Electrochromic Thin Films via Layer-by-Layer Assembly of Starlike and Sulfonated Polyaniline", *Chemistry of Materials*, **22**, 6085-6091 (2010).

67. A. Shukla, S.N. Avadhany, J.C. Fang, P.T. Hammond, "Tunable Vancomycin Releasing Surfaces for Biomedical Applications", *Small*, **6**, 2392-2404 (2010).

68. Z. Poon, S. Chen, A.C. Engler, H.I. Lee, E. Atas, G.V. Maltzahn, S.N. Bhatia and P.T. Hammond, "Ligand-clustered "patchy" nanoparticles for modulated cellular uptake and in vivo tumor targeting", *Angewandte Chemie*, **49**, 7266-7270 (2010).

69. B.-S. Kim, S.W. Lee, H. Yoon, M.S. Strano, Y. Shao-Horn, P.T. Hammond, "Pattern transfer printing of multi-walled carbon nanotube multilayers and application in biosensors", *Chemistry of Materials, **22***, 4791–4797 (2010).

70. M.L. Macdonald, N.M. Rodriguez, P.T. Hammond, "Characterization of tunable FGF-2 releasing polyelectrolyte multilayers", *Biomacromolecules,* **11***,* 2053–2059 (2010).

71. S.W. Lee, J. Kim, S. Chen, P.T. Hammond, Y. Shao-Horn, "Carbon Nanotube/Manganese Oxide Ultrathin Film Electrodes for Electrochemical Capacitors", *ACS Nano*, **4**, 3889–3896 (2010).

72. J.A. Lee, Y.S. Nam, G.C. Rutledge, P.T. Hammond, "Enhanced Photocatalytic Activity using Layer-by-Layer Electrospun Constructs for Water Remediation," *Advanced Functional Materials*, **20**, 2424-2429 (2010).

73. P.T. Hammond, "Particles release", *Nature Materials*. **9**, 292-293 (2010).

74. S.W. Lee, N. Yabuuchi, B.M. Gallant, S. Chen, B.-S. Kim, P.T. Hammond, Y. Shao-Horn "High-power lithium batteries from functionalized carbon-nanotube electrodes", *Nature Nanotechnology* **5**, 531-537 (2010).

75. J.N. Ashcraft, A.A. Argun, P.T. Hammond, "Structure-property studies of highly conductive layer-by-layer assembled membranes for fuel cell PEM applications," *Journal of Materials Chemistry*, **20**, 6250-6257 (2010).

76. J.S. Moskowitz, M.R. Blaisse, R.E. Samuel, H.-P Hsu, M.B. Harris, S.D. Martin, J.C. Lee, M. Spector, P.T. Hammond, "The effectiveness of the controlled release of gentamicin from polyelectrolyte multilayers in the treatment of Staphylococcus aureus infection in a rabbit bone model", *Biomaterials,* **31**, 6019-6030 (2010).

77. M.E. Yurchenko, J. Huang, A. Robisson, G.H. McKinley, P.T. Hammond, "Synthesis, mechanical properties and chemical/solvent resistance of crosslinked poly(aryl-ether-ether-ketones) at high temperatures", *Polymer*, **51**, 1914-1920 (2010).

78. S.Y. Wong, Q. Li, J. Veselinovic, B.-S. Kim, A.M Klibanov, P.T. Hammond, "Bactericidal and virucidal ultrathin films assembled layer by layer from polycationic N-alkylated polyethylenimines and polyanions", *Biomaterials,* **31**, 4079-4087 (2010).

"Controlling the release of peptide antimicrobial agents from surfaces", *Biomaterials*, **31**, 2348-2357 (2010).

80. A.A. Argun, J. N.Ashcraft, M.K. Herring, D.K.Y. Lee, H.R. Allcock and P.T. Hammond, and "Ion Conduction and Water Transport in Polyphosphazene-Based Multilayers", *Chemistry of Materials*, **22(1)**, 226-232 (2010).

81. D.J. Schmidt, E.M. Pridgen, P.T. Hammond, J.C. Love, "Layer-by-Layer Assembly of a pH-Responsive and Electrochromic Thin Film" *Journal of Chemical Education,* **87**, 208-211 (2010).

82. L. Chen, L. Bromberg, J.A. Lee, H. Zhang, H. Schreuder-Gibson, P. Gibson, J. Walker, P.T. Hammond, T.A. Hatton, G.C. Rutledge, "Multifunctional Electrospun Fabrics via Layer-by-Layer Electrostatic Assembly for Chemical and Biological Protection" *Chemistry Materials,* **22**, 1429-1436 (2010).

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