Hyo-Jick Choi, Ph.D.

Sustainable Engineering & Drug Delivery Design (SE∃D) Lab
Department of Chemical and Materials Engineering
University of Alberta
Donadeo ICE, 13-281, 9211-116 St
Edmonton, AB, Canada T6G 1H9

Phone: 780-248-1666
Fax: 780-492-2881
hyojick@ualberta.ca
www.hyojickchoi.com

EDUCATION

06.2009-09.2010	Postdoctoral Associate	School of Chemical and Biomolecular Engineering Georgia Institute of Technology Mentor: Mark R. Prausnitz Research Topic: Transdermal drug delivery: Influenza vaccine-coated microneedles.
09.2006-06.2007	Ph.D.	Department of Biomedical Engineering University of Cincinnati Advisor: Carlo D. Montemagno Dissertation: Advanced material structure to facilitate biofunctionality: nano-bio biotic/abiotic hybrid systems and their applications.
09.2002-06.2006	M.S.	Department of Biomedical Engineering University of California, Los Angeles (UCLA) Advisor: Carlo D. Montemagno
03.1999-02.2001	M.S.	Department of Ceramic Engineering Yonsei University, Seoul, Korea Advisor: Dae-Hong Ko Thesis: A study on the germanosilicide formation in the Ni-$Si_{1-X}Ge_X$ system for CMOS devices.
03.1993-02.1999	B.S.	Department of Ceramic Engineering Yonsei University, Seoul, Korea

ACADEMIC POSITIONS

01.2015-present	Assistant Professor Department of Chemical and Materials Engineering University of Alberta
10.2013-12.2014	Research Associate Department of Chemical and Materials Engineering University of Alberta
09.2010-10.2013	Research Assistant Professor Department of Biomedical, Chemical and Environmental Engineering University of Cincinnati

WORK EXPERIENCE

06.2007-05.2009 **Founding member** and Research & Development Manager in Danfoss AquaZ, Inc., which is involved in the developments of hybrid water purification membranes using Aquaporin Z-incorporated polymersomes.

Dr. Choi's research provided a key technical background for developing hybrid **reverse osmosis water purification membranes** using protein-embedded artificial cell mimics.

06.2010 **Founding member** of Ensovi, LLC
Dr. Choi's research provided a key technical background for developing **biofuel production** in the artificial cell-embedded bubble architecture.

CONSULTING

01.2015-Present GRoWater, Inc. (Scientific Advisory Board Member)

07.2006-05.2007 Danfoss AquaZ, Inc.
3130 Highland Ave. Cincinnati, OH 45219 USA

EDITORIAL DUTIES

2016-present Editorial Board Member, Scientific Reports-Nature
2015-present Section editor, SM Journal of Nanotechnology and Nanomedicine (SMJNT)

MANUSCRIPT REVIEWER

Biomaterials (2015-), Journal of Nanoparticle Research (2015-), Materials (2015-), Sensors (2016-), Journal of Controlled Release (2016-), Process Biochemistry (2016-), Applied Sciences (2016-), Polymers (2017-)

RESEARCH AREAS

My areas of research have included the developments of noninvasive vaccine/drug delivery systems (e.g. oral vaccine/vaccine delivery), solid vaccine formulations, microfabricated drug delivery systems, microneedle vaccine, and universal infection control measures against airborne pathogens (e.g. mask, respirator).

PUBLICATIONS

1. A.-R. Kim, D.-H. Lee, S.-H. Lee, I. Rubino, **H. –J. Choi**, F.-S. Quan*, PLoS One 13(1): e0191277 (2018),
   "Protection induced by virus-like particle vaccine containing tandem repeat gene of respiratory syncytial virus G protein"
2. M.-C. Kim, Y.-N. Lee, Y.-J. Kim, **H.–J. Choi**, K.-H. Kim, Y.-J. Lee, S.-M. Kang*, Antiviral Research, 148, 43 (2017),
   "Immunogenicity and efficacy of replication-competent recombinant influenza virus carrying multimeric M2 extracellular domains in a chimeric hemagglutinin conjugate"
3. W.H. Choi, **H. –J. Choi**, T.W. Goo, F.-S. Quan*, Entomological Research, DOI: 10.1111/1748-5967.12259 (2017),

"Novel antibacterial peptides induced by probiotics in *Hermetia illucens* (Diptera: Stratiomyidae) larvae"

4. I. Rubino, H. –J. Choi*, **Trends in Biotechnology**, http://dx.doi.org/10.1016/j.tibtech.2017.06.005 (2017).
"Respiratory Protection against Pandemic and Epidemic Diseases"

5. A. Kumar, C.D. Montemagno*, H. –J. Choi*, **Scientific Reports**, 7, 3059 (2017).
"Smart Microparticles with a pH-responsive Macropore for Targeted Oral Drug Delivery"

6. S.-H. Lee, A.-R. Kim, D.-H. Lee, I. Rubino, H. –J. Choi, F. S. Quan*, **PLoS One**, 12(4), e0175644 (2017).
"Protection induced by virus-like particles containing Toxoplasma gondii microneme protein 8 against highly virulent RH strain of Toxoplasma gondii infection"

7. F. Quan, I. Rubino, S. Lee, B. Koch, H. –J. Choi*, **Scientific Reports**, 7, 39956 (2017).
"Universal and reusable virus deactivation system for respiratory protection"

8. B. Koch, I. Rubino, F.-S. Quan, B. Yoo, H. –J. Choi*, **Materials**, 9(8), 646 (2016).
"Microfabrication for Drug Delivery"

9. J. Kim, I. Rubino, J.-Y. Lee, H. –J. Choi*, **Materials Research Express**, 3, 045019 (2016).
"Application of Halloysite Nanotubes for Carbon Dioxide Capture"

10. Y.C. Kim, S.H. Lee, W.H. Choi, H. –J. Choi, T.W. Goo, J.H. Lee, F.S. Quan, **Journal of drug targeting**, DOI:10.3109/1061186X.2016.1159213 (2016).
"Microneedle delivery of trivalent influenza vaccine to the skin induces long-term cross-protection"

11. H. –J. Choi, J. –M. Song, B. J. Bondy, R. W. Compans, S. –M. Kang, M. Prausnitz, **PLoS One** 10(7), e0134431 (2015).
"Effect of osmotic pressure on the stability of whole inactivated influenza vaccine for coating on microneedles"

12. M. –C. Kim, J. –W. Lee, H. –J. Choi, Y. –N. Lee, H. S. Hwang, J. Lee, C. Kim, J. S. Lee, C. Montemagno, M. R. Prausnitz, S. –M. Kang, **Journal of Controlled Release** 210, 208-216 (2015).
"Microneedle patch delivery to the skin of virus-like particles containing heterologous M2e extracellular domains of influenza virus induces broad heterosubtic cross-protection"

13. J. Patel, M. –C. Kim, V. F. Vartabediana, Y. –N. Lee, S. He, J. –M. Song, H. –J. Choi, S. Yamanaka, N. Amarama, A. Lukachera, C. Montemagno, R. W. Compans, S. –M. Kang, P. Selvaraja, **Nanomedicine** 11(5), 1097-1107 (2015).
"Protein transfer-mediated surface engineering to adjuvantate virus-like nanoparticles for enhanced anti-viral immune responses"

14. H. –J. Choi, M. –C. Kim, S. –M. Kang, C. D. Montemagno, **Archives of Pharmacal Research** 37(12), 1607-1616 (2014).
"The osmotic stress response of split influenza vaccine particles in an acidic environment"

15. H. –J. Choi, C. D. Montemagno, **Materials** 6(12), 5821-5856 (2013).
"Recent progress in advanced nanobiological materials for energy and environmental applications"). ***97%ile Ranks 1st in Materials journal (as of 21st April 2014)***

16. H. –J. Choi, T. J. Stazak, C. D. Montemagno, **Journal of Nanoparticle Research** 15(10), 1-13 (2013).
"Surface-dependent cytotoxicity on bacteria as a model for environmental stress of halloysite nanotubes"

17. H. –J. Choi, C. Ebersbacher, M. –C. Kim, S. –M. Kang, C. D. Montemagno, **PLoS One** 8(6), e66316 (2013). ***Highlighted as a key scientific article of Global Medical Discovery (June 28, 2013)***
"A mechanistic study on the destabilization of whole inactivated influenza virus vaccine in gastric environment"

18. H. –J. Choi, C. Ebersbacher, F. S. Quan, C. D. Montemango, **Nanotechnology** 24(5), 055603 (2013). ***Feature cover article / a key scientific article in June 2013 issue of Global Medical Discovery***
"pH stability and comparative evaluation of ranaspumin-2 foam for application in biochemical reactors"

19. H. –J. Choi, B. Bondy, D. –G. Yoo, R. W. Compans, S. –M. Kang, M. R. Prausnitz, **Journal of Controlled Release** 166(2), 159-171 (2013).
"Stability of whole inactivated influenza virus vaccine during coating onto metal microneedles"

20. H. –J. Choi, C. Ebersbacher, N. V. Myung, C. D. Montemagno, **Journal of Nanoparticle Research** 14(9), 1092:1-13 (2012).
"Synthesis of nanoparticles with frog foam nest proteins"

21. H. –J. Choi, D. –G. Yoo, B. Bondy, F. –S. Quan, R. W. Compans, S. –M. Kang, M. R. Prausnitz, **Biomaterials** 33(14), 3756-3769 (2012).
"Stability of influenza vaccine coated onto microneedles"

22. H. –J. Choi, D. Wendell, C. D. Montemagno, **NanoBiotechnology** 3(2), 66-75 (2007).
"Advances in nano biotic/abiotic hybrid systems: Protein-based engineered devices"

23. H. –J. Choi, C. D. Montemagno, **IEEE Trans. on Nanotechnology** 6(2), 171-176 (2007).
"Light-driven hybrid bioreactor based on protein-incorporated polymer vesicles"

24. H. –J. Choi, C. D. Montemagno, **Nanotechnology** 17, 2198-2202 (2006).
"Biosynthesis within a bubble architecture"

25. H. –J. Choi, J. Germain, C. D. Montemagno, **Nanotechnology** 17, 1825-1830 (2006).
"Effect of different reconstitution procedures on membrane protein activities in proteopolymersomes"

26. H. –J. Choi, C. D. Montemagno, **Nano Letters** 5, 2538-2542 (2005).
"Artificial organelle: ATP synthesis from cellular mimetic polymersomes"

27. H. –J. Choi, H. Lee, C. D. Montemagno, **Nanotechnology** 16, 1589-1697 (2005).
"Toward hybrid proteo-polymeric vesicles generating a photo-induced proton gradient for biofuel cells"

28. H. –J. Choi, E. Brooks, C. D. Montemagno, **Nanotechnology** 16, S143-149 (2005).

"Synthesis and characterization of nanoscale biomimetic polymer vesicles and polymer membranes for bioelectronic applications"

29. M. –J. Kim, H. –J. Choi, D. –H. Ko, J. –H. Ku, S. Choi, K. Fujihara, C. –W. Yang, **Electrochemical and Solid State Letters** 6(10), G122-125 (2003).
"High thermal stability of Ni monosilicide from Ni-Ta alloy films on Si(100)"

30. S. –W. Nam, J. –H. Yoo, S. Nam, H. –J. Choi, D. Lee, D. –H. Ko, J. H. Moon, J. –H. Ku, S. Choi, **Journal of Non-Crystalline Solids** 303, 139-143 (2002).
"Influence of annealing condition on the properties of sputtered hafnium oxide"

31. M. –J. Kim, H. –J. Choi, D. –H. Ko, J. –H. Ku, S. Choi, K. Fujihara, C. –W. Yang, **Journal of the Korean Physical Society** 40(4), 737-741 (2002).
"Formation and thermal stability of Ti-capped Co-silicide from Co-Ta alloy films on (100) Si and polycrystalline silicon"

BOOK CHAPTER

1. H. –J. Choi*, C. D. Montemagno*, "Nanobiotechnology: transforming ideas to reality" SpringerReference, Springer International Publishing Switzerland 2014.

2. H. –J. Choi*, C. D. Montemagno*, Epidemiology-theory, research and practice, "Assessment of osmotic characteristics of influenza viruses" iConcept Press Ltd., ISBN 978-1-922227-33-1 (2014).

PRESENTATIONS

1. A. Kumar, C. D. Montemagno*, H. –J. Choi*,"Targeted Oral Vaccine Delivery System" Collaborative Conference on Materials Research (CCMR), June 28, 2017, Jeju, Korea (**Invited**).

2. A. Kumar, H. –J. Choi*, C. D. Montemagno*, "Targeted Oral Vaccine Delivery System" Collaborative Conference on Materials Research (CCMR), June 26, 2017, Jeju, Korea.

3. I. Rubino, H. –J. Choi*, "Development of a Universal and Recyclable Virus Deactivation System for Protection against Airborne Transmissible Pathogenic Aerosols" MRS Spring Meeting, April 19, 2017, Phoenix, Arizona, USA.

4. B. Homayun, A. Kumar, C. Sun, H. –J. Choi*, C. D. Montemagno*, "pH-sensing drug delivery system using anionic copolymer" MRS Winter Meeting, Nov 30, 2016, Boston, Massachusetts, USA

5. H. –J. Choi, "Technical Challenges for Oral Influenza Vaccine Development" Canada-Korea Conference on Science and Technology (CKC 2015), July 27, 2015, Kananaskis, Calgary, Canada (**Invited**).

6. H. –J. Choi, "Development of long-term stable, solid influenza vaccine formulations" Collaborative Conference on 3D & Materials Research (CC3DMR), June 16, 2015, Busan, Korea (**Invited**).

7. A. Kumar, H. –J. Choi*, C. D. Montemagno*, "Development of Oral Influenza Vaccines: One Step Closer" MRS Spring Meeting, April 8, 2015, San Francisco, California, USA.

8. H. –J. Choi*, A. Kumar, C. D. Montemagno*, “One-Stop Solution for Delivery of Unstable Oral Drugs” MRS Spring Meeting, April 8, 2015, San Francisco, California, USA.

9. H. –J. Choi, D. –G. Yoo, R. W. Compans, S. –M. Kang, M. R. Prausnitz, 1st international conference on microneedles, May 2010, Atlanta, USA
“Long-term stability of the influenza vaccine-coated microneedles”

10. H. –J. Choi, C. D. Montemagno, IEEE Nanotechnology, 2006, Cincinnati, USA
“Reconstruction of cellular processes in nanoscale artificial organelles”

11. J. Isobe, Z. Qu, J. Patti, D. Wendell, H. –J. Choi, C. Montemagno, WSEAS Trans. on Systems, vol. 2, 347-352, 2006.
“Preliminary studies on the effect of size on the action potential of an excitable vesicle”

12. H. –J. Choi, C. D. Montemagno, CNSI (California Nanosystems Institute) 2nd Annual Frontiers in Nanosystems, Feb. 2006, Hawaii, USA (invited)
“Engineering Life into Materials”

13. H. –J. Choi, C. D. Montemagno, SPIE Symposium on Smart Structures and Materials & NDE, Feb. 2006, Sandiego, USA (Proc of SPIE vol. 6167, 61671W1-9)
“Hybrid biotic/abiotic nanofactory”

14. H. –J. Choi, D. Wendell, C. D. Montemagno, ICIM 05 (The 6th International Conference on Intelligent Materials and Systems) July 2005, Tokyo, Japan,
“Engineering Emergent Functionality Using Synthesized Biomimetic Polymer Vesicles: Intervesicular Communication”

15. H. –J. Choi, E. Brooks, C. K. Lin, C. D. Montemagno, TNT 2004 (Trend in Nanotechnology) September 2004, Segovia, Spain,
“Synthesis and characterization of biomimetic polymer vesicles and polymer monolayer membranes for bioelectronic applications”

16. M. –J. Kim, H. –J. Choi, D. –H. Ko, Mat. Res. Soc. Symp. Proc. Vol.670, K6.5.1-6, 2001.
“Increased thermal stability of Co-silicide using Co-Ta alloy films”

17. D. Lee, H. –J. Choi, S. –W. Nam, S. Nam, D. –H. Ko, 21st Korean Vacuum Society 2001
“A study of MOS characteristics of reoxidized HfO_2 thin film for gate oxide oxidations”

18. C. –J. Choi, J. –H. Ku, S. Choi, K. Fujihara, H. –K. Kang, J. –T. Moon, H. –J. Choi, D. –H. Ko, 2001 Electrochemical society proceedings. Vol. 2001-2, 565-570.
“Ni salicide technology for deep sub-quarter micron transistor”

19. H. –J. Choi, D. –H. Ko, J. –H. Ku, C. –J. Choi, S. Choi, K. Fujihara, H. –K. Kang, C. –W. Yang, The 2001 International Conference on Solid State Devices and Materials (SSDM 2001) September, Tokyo, Japan.
“A Study on the germano-silicide formation in the $Ni/Si_{1-x}Ge_x$ system for CMOS device applications”

20. H. –J. Choi, D. –H. Ko, J. –H. Ku, C. –J. Choi, S. Choi, K. Fujihara, H. –K. Kang, M. –H. Yang, C. –W. Yang, 2001 Electrochemical society (ECS) proceeding vol. 2001-2, 591-599.
"A Study on the germano-silicide formation in the Ni/$Si_{1-X}Ge_X$ system using rapid thermal annealing (RTA) process"

21. D. –H. Lee, D. –H. Ko, H. –J. Choi, J. –H. Ku, S. Choi, K. Fujihara, H. –K. Kang, S. –H. Oh, C. –G. Park, H. –J. Lee, The 2000 International Conference on Solid State Devices and Materials (SSDM 2000) August, Sendai, Japan.
"The formation of high temperature stable Co-silicide from $Co_{1-X}Ta_X$/Si systems"

22. J. –H. Ku, C. –J. Choi, S. Song, S. Choi, K. Fujihara, H. –K. Kang, S. –I. Lee, H. –G. Choi, D. –H. Ko, 2000 Symposium on VLSI Technology Digest of Technical Papers 114-115.
"High performance pMOSFETs with Ni(Si_XGe_{1-X})/Poly-$Si_{0.8}Ge_{0.2}$ gate"

INVITED LECTURES & SEMINARS

1. "Preparation for the next Pandemic Influenza Outbreak", University of Alberta, ImmuNet Seminar Series, May 18th, 2017.

2. "Strategies for Pandemic Influenza: Focus on Microneedles", University of Alberta, Li Ka Shing Institute of Virology, January, 2014.

3. "Microneedles for Transdermal drug delivery: stability of the influenza vaccine-coated microneedles", University of Cincinnati, Department of Chemical & Materials Engineering, Cincinnati, USA, June 2nd, 2011.

4. "Engineering complex functionality in polymer vesicles", Yale University, Department of Chemical Engineering, New Haven, USA, April 10th, 2009.

5. "Engineering the functionality of protein-incorporated polymer vesicles", University of California, Santa Barbara, Department of Mechanical Engineering, Santa Barbara, USA, March 17th, 2009.

6. "Advanced material structure to facilitate biofunctionality: Nano biotic/abiotic hybrid systems and their applications", Columbia University, Department of Biomedical Engineering, New York, USA, January 06th, 2009.

7. "Engineering life into materials", Hanyang University, Department of Biomedical Engineering, Seoul, Korea, October 24th, 2007.

8. "Engineering life into materials: nano biotic/abiotic hybrid systems", Yonsei University, Department of Materials Science & Engineering, Seoul, Korea, October 26th, 2007.