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EDUCATION

- Ph.D. Department of Chemical Engineering / Program in Polymer Science and Technology, Massachusetts Institute of Technology (9/2001 ~ 6/2006).
- B.S. Department of Chemical Engineering, Seoul National University (3/1995 ~ 2/1999)

PROFESSIONAL CAREER

- Visiting Associate Professor, Department of Chemical and Biomolecular Engineering, University of Pennsylvania (7/2014 ~ 3/2015).
- Associate Professor, I-Bio/Department of Mechanical Engineering, POSTECH (3/2013 ~ present)
- Assistant Professor, I-Bio/Department of Mechanical Engineering, POSTECH (2/2008 ~ 2/2013).
- Postdoctoral Researcher, Department of Pathology, University of California at San Francisco (9/2006 ~ 1/2008).
- Postdoctoral Researcher, Department of Materials Science and Engineering, Massachusetts Institute of Technology (6/2006 ~ 8/2006).

RESEARCH AREAS

- Cancer immunotherapy
- Dynamic micropatterning of proteins and cells
- Micro-engineered platforms for the study of immune cell communications
- Multi-scale fluorescence imaging (two-photon, confocal, TIRF, wide-field) of molecular and cellular dynamics
- Bio-mechanics of immune cell migration

PROFESSIONAL ACTIVITIES

- Faculty Member of Faculty of 1000 (F1000) in Cell Adhesion & Migration (8/2014 ~ present).
- Editorial board member of PLoS One (9/2014 ~ present).
- Editorial advisory board member of F1000Research (12/2014 ~ present).

- Member of Biomedical Engineering Society (BMES), American Association of Immunologists (AAI), American Society for Cell Biology (ASCB), and Biophysical Society (BPS).
- Member of Korean Biochip Society (KBCS), Korean Society of Mechanical Engineers (KSME), Korean Association of Immunologists (KAI).
- Reviewer of *PNAS*, *Science Adv.*, *Acc. Chem. Res.*, *J. Am. Chem. Soc.*, *ACS Nano*, *ACS Appli. Mat. Inter.*, *Langmuir*, *J. Phys. Chem.*, *Mol. Pharm.*, *Biomaterials*, *Acta Biomaterialia*, *Biotechnology & Bioengineering*, *J. R. Soc. Interface*, *Nanoscale*, *Integrative Biology*, *Lab Chip*, *Adv. Funct. Mat.*, *Small*, *Adv. Healthcare Mat*, *Scientific Reports*, *Biofabrication*, *Sensors & Actuators: B. Chemical*, *Polymer International*, *Phys. Biol.*, *J. Control. Release*.

PUBLICATIONS

Invited Reviews

1. J. Kang, J.-C. Choi, M. Kim, H.-R. Jung, and J. Doh*, Photopatterning with a printed transparency mask and a protein-friendly photoresist, *Method Cell Biol.* **119**, 55 (2014).
2. H.-R. Jung, J.-C. Choi, W. Cho, and J. Doh*, Microfabricated platforms to modulate and monitor T cell synapse assembly, *Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology* **5**, 67 (2013).
3. J. Doh and M.F. Krummel, Immunological synapses within context: patterns of cell-cell communication and their application in T-T interactions, *Curr. Topics Microbiol. Immunol.* **340**, 25 (2010).
4. D.J. Irvine and J. Doh, Synthetic surfaces as artificial antigen presenting cells in the study of T cell receptor triggering and immunological synapse formation, *Semin. Immunol.* **19** (4), 245 (2007).
5. D.J. Irvine, J. Doh, and B.B. Huang, Patterned surfaces as tools to study ligand recognition and synapse formation by T cells, *Curr. Opin. Immunol.* **19** (4), 463 (2007).

Research Articles

1. S. Lee, O. Kwon, M. Jeon, J. Song, S. Shin, H.M. Kim, M. Jo, T. Rim, J. Doh, S. Kim, J. Son, Y. Kim, C. Kim, Super-resolution Atomic Force Photoactivated Microscopy, *Light: Sci. Appl.* (in press).
2. T.-D. Kim, H.-R. Jung, S.-H. Seo, S.-C. Oh, Y. Ban, X. Tan, J.M. Kim, S.H. Lee, D.-S. Koh, H. Jung, Y.-J. Park, S.R. Yoon, J. Doh, S.-J. Ha, I. Choi, and P.D. Greenberg, MicroRNA-150 modulates intracellular Ca²⁺ levels in naïve CD8+ T cells by targeting TMEM20, *Sci. Rep.* **7**, 2623 (2017)
3. E. Yeon, H.M. Kim, J.H. Park, W. Choi, J. Doh, and S.J. Lee, Microfluidic system for monitoring temporal variations of hemorheological properties and platelet adhesion in LPS-injected rats, *Sci. Rep.* **7**, 1801 (2017).
4. M. Kim, T.-J. Kim, J. Doh*, and K.-M. Lee*, Multi-cullular natural killer (NK) cell clusters enhance NK cell activation through localizing IL-2 within the cluster, *Sci. Rep.* **7**, 40623 (2017).

5. W. Choi, H.M. Kim, S. Park, E. Yeon, J. Doh, and S.J. Lee, Variation in Wall Shear Stress in Channel Networks of Zebrafish Models, *J. R. Soc. Interface* **14**, 20160900 (2017).
6. D. Jung, Y.M. Lee, J. Lee, J. Doh, and W.J. Kim, Remission of lymphoblastic leukaemia in an intravascular fluidic environment by pliable drug carrier with a sliding target ligand, *Sci. Rep.* **7**, 40739 (2017).
7. H. Byeon, J. Lee, J. Doh*, and S.J. Lee*, Hybrid bright-field and hologram imaging of cell dynamics, *Sci. Rep.* **6**, 33750 (2016).
8. M. Kim, J. Doh*, and D. Lee*, pH-induced softening of polyelectrolyte microcapsules without apparent swelling, *ACS Macro Lett.* **5**, 487 (2016).
9. K.H. Song, J. Lee, H. Park, H.M. Kim, J. Park, K.W. Kwon, and J. Doh*, Roles of endothelial A-type lamins in migration of T cells on and under endothelial layers, *Sci. Rep.* **6**, 23412 (2016).
10. K.D. Seo, A. Choi, J. Doh, and D.S. Kim, Synthesis of Poly(N-isopropylacrylamide) Janus Microhydrogels for Anisotropic Thermo-responsiveness and Organophilic/Hydrophilic Loading Capability, *J. Vis. Exp.* **108**, e52813 (2016).
11. S. Kweon, K.H. Song, H. Park, J.-C. Choi, and J. Doh*, Dynamic micropatterning of cells on nanostructured surfaces using a cell-friendly photoresist, *ACS Appl. Mater. Interfaces* **8**, 4266 (2016).
12. G. Shin, D.-K. Kim, J. Doh, D. Lee, N.K. Lee, and G.Y. Jung, High-Resolution Pluronic-filled Microchip CE-SSCP Analysis System via Channel Width Control, *Electrophoresis* **37**, 676 (2016).
13. H. Park and J. Doh*, Study on the role of microtubules on T cell migration under confined environments, *Biomed. Eng. Lett.* **5**, 188 (2015).
14. S. Lim, W.-J. Kim, Y.H. Kim, S. Lee, J.-H. Koo, J.-A. Lee, H. Yoon, D.-H. Kim, H.-J. Park, H.-M. Kim, H.-G Lee, J.Y. Kim, J.-U. Lee, J.H. Shin, L.K. Kim, J. Doh, H. Kim, S.-K. Lee, A. Bothwell, M. Suh, and J.-M. Choi, dNP2 is a blood-brain barrier-permeable peptide enabling ctCTLA-4 protein delivery to ameliorate experimental autoimmune encephalomyelitis, *Nat. Commun.* **6**, 8244 (2015).
15. M. Kim, S.J. Yeo, C. Highley, P.J. Yoo, J.A. Burdick, J. Doh*, and D. Lee*, One-step generation of multi-functional polyelectrolyte microcapsules via nanoscale interfacial complexation in emulsion (NICE), *ACS Nano* **9**, 8269 (2015).
16. M. Kim, M.S. Kim, S.H. Kweon, S. Jeong, M.H. Kang, M.I. Kim, J. Lee*, and J. Doh*, Simple and sensitive point-of-care bioassay system based on hierarchically structured enzyme-mimetic nanoparticles, *Adv. Healthcare Mater.* **4**, 1311 (2015).
17. K.H. Song, S.J. Park, D.S. Kim*, and J. Doh*, Sinusoidal wavy surfaces with various wavelengths for curvature-guided migration of T lymphocytes, *Biomaterials* **51**, 151 (2015).
18. W.-S. Jang, S.C. Park, M. Kim, J. Doh, D. Lee, and D.A. Hammer, The effect of stabilizer on the mechanical response of double-emulsion-templated polymersomes, *Macromol. Rapid Commun.* **36**, 378 (2015).
19. T.-J. Kim, M. Kim, H.M. Kim, S.A. Lim, E.-O. Kim, K. Kim, K.H. Song, J. Kim, V. Kumar, C. Yee, J. Doh*, and K.-M. Lee*, Homotypic NK cell-to-cell communication controls cytokine responsiveness of innate immune NK cells, *Sci. Rep.* **4**, 7157 (2014).

20. R. Sheng, H. Kim, H. Lee, Y. Xin, Y. Chen, W. Tian, Y. Cui, J.-C. Choi, J. Doh, J.-K. Han, and W. Cho, Cholesterol selectively activates canonical Wnt signaling over non-canonical Wnt signaling, *Nat. Comm.* **5**, 4393 (2014).
21. N. Kim, M. Kim, S. Yun, J. Doh, P. D. Greenberg, T.-D. Kim, and I. Choi, MicroRNA-150 regulates the cytotoxicity of natural killers by targeting perforin-1, *J. Allergy Clin. Immunol.* **134**, 195 (2014).
22. J.Y. Park, J.-C. Choi, J.-H. Shim, J.-S. Lee, H. Park, S.W. Kim, J. Doh*, and D.-W. Cho*, A comparative study on collagen type I and hyaluronic acid dependent cell behaviors for osteochondral tissue bioprinting, *Biofabrication* **6** 035004 (2014).
23. S.J. Park, H. Namkoong, J. Doh, J.-C. Choi, B.-G. Yang, Y. Park, and Y.-C. Sung, Negative role of inducible PD-1 on survival of activated dendritic cells, *J. Leukoc. Biol.* **95**, 621 (2014).
24. K.H. Song, K.W. Kwon, J.-C. Choi, J. Jung, Y. Park, K.-Y. Suh, and J. Doh*, T cells sense biophysical cues using lamellipodia and filopodia to optimize intraluminal path finding, *Integr. Biol.* **6**, 450 (2014).
25. H.-R. Jung, K.H. Song, J.T. Chang*, and J. Doh*, Geometrically controlled asymmetric division of CD4+ T cells studied by immunological synapse arrays, *PLoS One* **9**, e91926 (2014).
26. J.-C. Choi, H.-R. Jung and J. Doh*, Dynamic modulation of small-sized multicellular clusters using a cell-friendly photoresist, *ACS Appl. Mater. Interfaces* **5**, 12757 (2013).
27. K.D. Seo, J. Doh, and D.S. Kim, One-step microfluidic synthesis of Janus microhydrogels with anisotropic thermo-responsive behavior and organophilic/hydrophilic loading capability, *Langmuir* **29**, 15137 (2013).
28. K.W. Kwon, H. Park, and J. Doh*, Migration of T cells on surfaces containing complex nanotopography, *PLoS One* **8**, e73960 (2013).
29. M. Kim, K.H. Song, and J. Doh*, PDMS bonding to a bio-friendly photoresist via self-polymerized polydopamine adhesive for complex protein micropatterning inside microfluidic channels, *Colloid Surf. B: Biointerfaces* **112**, 134 (2013).
30. S.-H. Jun, K. Kim, H.J. An, B.C. Kim, C. H. Sonn, M. Kim, J. Doh, C. Yee, K.-M. Lee, and J. Kim, Ethanol-Dispersed Polymer Nanofibers as a Highly Selective Cell Isolation and Release Platform for CD4+ T Lymphocytes, *Adv. Funct. Mat.* **22**, 4448 (2012).
31. J.-C. Choi and J. Doh*, High-throughput quantitative imaging of cell spreading dynamics by multi-step microscopy projection photolithography based on a cell-friendly photoresist, *Lab Chip* **12**, 4964 (2012).
32. K.W. Kwon, H. Park, K. H. Song, J.-C. Choi, H. Ahn, M.J. Park, K.-Y. Suh*, and J. Doh*, Nanotopography-guided migration of T cells, *J. Immunol.* **189**, 2266 (2012).
33. K.H. Song, K.W. Kwon, S. Song, K.-Y. Suh*, and J. Doh*, Dynamics of T cells on endothelial layers aligned by nanostructured surfaces, *Biomaterials* **33**, 2007 (2012).
34. B. Jeong, B. Lee, M.S. Jang, H. Nam, S.J. Yoon, T. Wang, J. Doh, B.-G. Yang, M.H. Jang, K.H. Kim, Combined two-photon microscopy and optical coherence tomography for in-vivo tissue imaging, *Opt. Express* **19**, 13089 (2011).
35. K.W. Kwon, J.-C. Choi, K.-Y. Suh*, and J. Doh*, Multiscale Fabrication of Multiple Proteins and Topographical Structures by Combining Capillary Force

- Lithography and Microscope Projection Photolithography, *Langmuir* **27**, 3238 (2011).
36. S.-H. Kim, W. Chegal, J. Doh, H.M. Cho, D. W. Moon, Study of cell-matrix adhesion dynamics using surface plasmon resonance imaging ellipsometry, *Biophys. J.* **100**, 1819 (2011).
 37. M. Kim, J.-C. Choi, H.-R. Jung, J.S. Katz, M.-G. Kim*, and J. Doh*, Addressable micropatterning of multiple proteins and cells by microscope projection photolithography based on a protein friendly photoresist, *Langmuir* **26**, 12112 (2010).
 38. S.-H. Park, J. Doh, S.I. Park, J.Y. Lim, S.M. Kim, J.-I. Youn, H.-T. Jin, S.-H. Seo, M.-Y. Song, S.Y. Sung, M. Kim, S.J. Hwang, J.-M. Choi, S.-K. Lee, H.Y. Lee, C.L. Lim, Y.J. Chung, D. Yang, H.-N. Kim, Z.H. Lee, K.Y. Choi, S.-S. Jeun and Y. C. Sung, Branched oligomerization of cell-permeable peptides markedly enhances transduction efficiency of adenovirus into mesenchymal stem cells, *Gene Ther.* **17**, 1052 (2010).
 39. G.W. Shin, H.S. Hwang, M.-H. Oh, J. Doh* and G.Y. Jung*, Simultaneous quantitative detection of 12 pathogens using high-resolution capillary electrophoresis-single strand conformation polymorphism, *Electrophoresis* **31**, 2405 (2010).
 40. G.W. Shin, H.S. Hwang, S.W. Seo, M.-H. Oh, C.Y. Ryu, C.J. Salvo, S. Feldman, J. Doh* and G.Y. Jung*, A novel pathogen detection system based on high-resolution CE-SSCP using a triblock copolymer matrix, *J. Sep. Sci.* **33**, 1 (2010).
 41. J. Doh*, M. Kim and M.F. Krummel*, Cell-laden microwells for the study of multicellularity in lymphocyte fate decisions, *Biomaterials* **31**, 3422 (2010).
 42. C.A. Sabatos#, J. Doh#, S. Chakravarti, P.G. Pandurangi, R.S. Friedman, A.J. Tooley and M.F. Krummel, A synaptic basis for paracrine interleukin-2 signaling in activating T cells. *Immunity* **29**, 238 (2008)
 43. P.J. Yoo, N.S. Zacharia, J. Doh, K.T. Nam, A.M. Belcher, and P.T. Hammond , Controlling Surface Mobility in Interdiffusing Polyelectrolyte Multilayers, *ACS Nano.* **2** (3), 561 (2008).
 44. J. Doh and D.J. Irvine, Immunological synapse arrays: Patterned protein surfaces that modulate immunological synapse structure formation in T cells, *Proc. Natl. Acad. Sci. USA* **103** (15), 5700 (2006).
 45. J.S. Katz, J. Doh, and D.J. Irvine, Composition-Tunable Properties of Amphiphilic Comb Copolymers Containing Protected Methacrylic Acid Groups for Multicomponent Protein Patterning, *Langmuir* **22** (1), 353 (2006).
 46. J. Doh and D.J. Irvine, Photogenerated polyelectrolyte bilayers from an aqueous-processible photoresist for multicomponent protein patterning., *J. Am. Chem. Soc.* **126** (30), 170 (2004).
 47. H. Kim, J. Doh, D.J. Irvine, R.E. Cohen, and P.T. Hammond, Large area two-dimensional B cell arrays for sensing and cell-sorting applications, *Biomacromolecules* **5**, 822 (2004).

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Manuscript submitted/in preparation

1. K.H. Song, J. Lee, H.-R. Jung, H. Park, and J. Doh*, Turning behaviors of T cells climbing ramp-like structures are regulated by myosin light chain kinase activity and lamellipodia formation, *Sci. Rep.* (under revision).
2. J. Lee, H.K. Huh, S. Park, S.J. Lee, and J. Doh*, Effect of post-stenotic flow on dynamic behaviors of T cells on endothelial layers, *Sci. Rep.* (under revision).
3. J.H. Sim, K.S. Kim, H. Park, K.J. Kim, H. Lin, T.-J. Kim, H.M. Shin, D.S. Lee, C.-W. Park, D.H. Lee, I. Kang, S.J. Kim*, C.-H. Cho*, J. Doh*, and H.-R. Kim*, Differentially expressed potassium channels are associated with function of human effector memory CD8+ T cells, *Front. Immunol.* (under revision).
4. H.M. Kim, H. Park, and J. Doh*, Multi-functional microwells for single immune cell analysis, *Bioconjug. Chem.* (invited review, in preparation)
5. S.M. Park, H.M. Kim, K.H. Song, S. Eon, H. Park, J. Doh*, and D.S. Kim*, An aligned free-standing nanofiber membrane to recapitulate multi-layered blood vessel/tissue interface for leukocyte infiltration study (submitted).
6. H. Park, and J. Doh, Migration of densely packed T cells, (in preparation).
7. J. Lee, K.H. Song, T. Kim, and J. Doh*, Roles of endothelial focal adhesion in transendothelial migration and subendothelial crawling of T cells, (in preparation).
8. J. Park, and J. Doh*, In situ detachment of subcellular regions using a cell-friendly photoresist, (in preparation).
9. M.S. Kim, S.H. Kewon, S. Jo, S.S. An, M.I. Kim*, J. Doh*, and J. Lee*, Highly sensitive point-of-care bioassay system based on Pt-decorated magnetic nanozymes, (in preparation).

Book chapters

1. H.M. Kim and J. Doh, Micro/nanofabrication for the study of biochemical and biomechanical regulation of T cell activation. In: Y. Sun, C. Simmons, and D.-H. Kim (Eds), *Integrative Mechanobiology: Micro and Nano Techniques in Cell Mechanobiology*.
2. D.J. Irvine and J. Doh, Microfabricated systems for analyzing immune cell functions. In: A. Khademhosseini, J. Borenstein, S. Takayama, and M. Toner (Eds), *Micro- and Nanoengineering of the Cell Microenvironment: Technologies and Applications*.
3. Y. Yun, L. Conforti, Z. Dong, V.N. Shanov, J.S. Shin, W. Heineman, H.B. Halsall, W. Feng, C.H. Ahn, and J. Doh, Nanoscale engineering of electrodes, biosensors, and protein surfaces. In: M.J. Schulz, V.N. Shanov, Y. Yun (Eds). *Nanomedicine: Design of particles, sensors, motors, implants, robots, and devices*.