B.J. KIM

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POSITIONS

01/2025-Present **Assistant Professor**, Molecular Pharmaceutics and Drug Delivery
UT Austin, College of Pharmacy

09/2019-12/2024 **Postdoctoral Associate**, Koch Institute
Massachusetts Institute of Technology (Prof. Darrell J. Irvine)

EDUCATION

09/2014-06/2019 **Ph.D. in Materials Science and Engineering**
University of California, San Diego (UCSD)- San Diego, California
Advisor: Prof. Michael J. Sailor
Co-advisor: Dr. Stephen B. Howell
"Fusogenic Porous Silicon Nanoparticles as a Platform Technology for Gene Therapy"

02/2012-02/2014 **M.S. in Bio and Brain Engineering**
Korea Advanced Institute of Science and Technology (KAIST)- Daejeon, South Korea
Advisor: Prof. Ji-Ho Park
"Fluorescence Detection and Photothermal Therapy of Sentinel Lymph Node Metastasis Using Liposomal Indocyanine Green"

09/2008-12/2011 **B.S.E. in Materials Science and Engineering**
University of Michigan- Ann Arbor, Michigan

TEACHING

PHM 287N, Biopharmaceutics
09/2026 (PharmD 1st year Fall course)
Complements the basic pharmaceutics principles covered in Pharmacy PharmD 387M. Subjects include core concepts in biopharmaceutics of drugs. Two lecture hours a week for one semester.

Kaufman Teaching Certificate Program
05/2022 – 07/2022 (Teaching and Learning Lab, MIT)

MENTORSHIP

Principal Investigator, Kimmunity Lab, UT Austin
01/2025 – Present

Ph.D. Students: Tony Szeglowski (Summer 2025 – Present); Ta-Jung (Darren) Hung (Fall 2025 – Present)

PharmD Student: Carlo Velazquez (Spring 2025 – Present)

Research Associate: Rachel Yeung (Winter 2025 – Present)

Undergraduate Students: Sanika Bedse (Neuroscience; Winter 2025 – Present); Rishi Prabhu (Public Health; Winter 2025 – Present); William Merlini (BME; Winter 2025 – Present); Leslie Valladares (Chemistry; Winter 2025 – Present); Ella Steinborn (Molecular Bio; Spring 2025 – Present); Clara Smyth (Chemistry; Summer 2025 – Present)

PUBLICATIONS

Citations Summary (Google Scholar as of 12/17/2025): Citations: 1,753; h-index: 14; i10-index: 17.

** indicates equal contribution*

1. **Kim B**, Hosn RR, Remba T, Dye J, Mak H, Jeong JY, Cornwall-Brady M, Abraham W, Maiorino L, Melo MB, Li B, Zhang Y, Dong Y, Irvine DJ. Targeted suppression of type 1 interferon signaling during RNA delivery enhances vaccine-elicited immunity. *In Revision*.
2. Wohlwend J, Reveiz M, Shanahan S, Kassama F, **Kim B**, Dye J, Irvine DJ, Jacks T, Barzilay R. More Generalizable TCR-pMHC Binding Prediction with Protein Structure Models. *Submitted.*
3. Shanahan S, Maiorino L, Chen J, Bhandari N, Lin J, **Kim B**, Dye J, Kassama FJ, Mathey-Andrews N, Hamad L, Dawson ER, Cabana CM, Rodriguez L, Jaeger AM, Westcott PMK, Santagata S, Irvine DJ, Schenkel JM, Jacks T. MHC-II antigen presentation on cancer cells improves CD4+ T cell immunity and vaccine efficacy. *Submitted.*
4. Tan Y,* **Kim B***, Mujal AM, Chen ACY, Weis AM, Bergaggio E, Micevic G, Xie H, Park JS, Hor JL, Papanicolaou M, Shobaki N, Domizi P, Delconte R, Vendramin R, Hegde S, Han S, Su Y, Hacohen N. Training Tomorrow's Leaders in Cancer Immunology. *Cancer Immunol Res*. (2026). *Accepted*
5. **Kim B***, Abdelfattah N*, Hostetler A*, Irvine DJ. Progress in Cancer Vaccines Enabled by Nanotechnology. *Nat Nanotechnol*. doi: 10.1038/s41565-025-02021-z (2025).
6. Cui Y, Phuong K, Abdelfattah N, Temple H, Maiorino L, **Kim B**, Dye J, Yu KKH, Irvine DJ, White FM. Quantitative cell type specific immunopeptidome analysis during macrophage and tumor co-evolution reveals therapeutic MHC-I restricted peptides in glioblastoma. *Cancer Res*. doi: 10.1158/0008-5472.CAN-24-4674 (2025).
7. Das Adhikari U, Froehle LM, Pipkin AN, Baharlou H, Linder AH, Shah P, Hussey A, Zhang Q, Nyquist S, Khawaled S, Chi F, Goswami S, Dieffenbach TJ, Read BJ, **Kim B**, Irvine DJ, Ladinsky MS, Bjorkman PJ, Asowata O, Madela FG, Khader S, Shalek AK, Ghebremichael M, Kloverpris HN, Ringel AE, Yilmaz OH, Kwon DS. PPARγ downregulation in colonic CD8+ T cells results in epithelial barrier disruption in people with HIV on antiretroviral therapy. *Cell.* doi: 10.1016/j.cell.2025.08.024 (2025).
8. Hollett G, Fan R, Kumeria T, Leonard H, **Kim B**, Martin TR, Ipekci I, Wang J, Byun J, Chan N, Pierron A, Moore CE, Ayres J, Sailor MJ. Longer Acting Injectable: Continuous, Linear Release of Progestin Contraceptive from an Oxidized Porous Silicon Host. *Adv Healthc Mater*. doi: 10.1002/adhm.202403802 (2025).
9. Buckley M, Araínga M, Maiorino L, Pires IS, **Kim B**, Michaels KK, Dye J, Qureshi K, Zhang Y, Mak H, Villinger F, Schief WR, Steichen JM, Irvine DJ. Visualizing lipid nanoparticle trafficking for mRNA vaccine delivery in non-human primates. *Mol Ther*. doi: 10.1016/j.ymthe.2025.01.008 (2025).
10. Pires IS, Hostetler A, Covarrubias G, Carlo IS, Suggs JR, **Kim B**, Irvine DJ, Hammond PT. Charge-Stabilized Nanodiscs as a New Class of Lipid Nanoparticles. *Adv Mater.* doi: 10.1002/adma.202408307 (2024).
11. Jiang K, Yan Z, Di Bernardo M, Sgrizzi S, Viliger L, Kayabolen A, **Kim B**, Carscadden J, Hiraizumi M, Nishimasu H, Gootenberg J, Abudayyeh O. Rapid in silico directed evolution by a protein language model with EVOLVEpro. *Science.* (2024).
12. Roerden M, Castro AB, Cui Y, Harake N, **Kim B**, Dye J, Maiorino L, White FM, Irvine DJ, Litchfield K, Spranger S. Neoantigen architectures define immunogenicity and drive immune evasion of sub-clonal tumors. *J Immunother Cancer.* doi: 10.1136/jitc-2024-010249 (2024).
13. Nguyen KB, Roerden M, Copeland CJ, Backlund CM, Klop-Packel NG, Remba T, **Kim B**, Singh NK, Birnbaum ME, Irvine DJ, Spranger S. Decoupled neoantigen cross-presentation in tumors with high intratumor heterogeneity reduces dendritic cell activation to limit anti-tumor immunity. *eLife.* doi: 10.7554/eLife.85263 (2023).
14. Backlund C*, Jalili S*, **Kim B***, Irvine DJ. Biomaterials-Mediated Engineering of the Immune System. *Annu Rev Immunol.* doi: 10.1146/annurev-immunol-101721-040259. PMID: 36696570 (2023).

15. Pires IS, Ni K, Melo MB, Li N, Ben-Akiva E, Maiorino L, Dye J, Rodrigues KA, Yun DS, **Kim B**, Hosn RR, Hammond PT, Irvine D. Controlled Lipid Self-Assembly for Scalable Manufacturing of Next-Generation Immune Stimulating Complexes. *Chem Eng J.* doi: 10.1016/j.cej.2023.142664 (2023).
16. **Kim B**, Hosn RR, Remba T, Yun D, Li N, Abraham W, Melo MB, Cortes M, Li B, Zhang Y, Dong Y, Irvine DJ. Optimization of Storage Condition for RNA-loaded Lipid Nanoparticle Vaccines. *J Control Release.* doi: 10.1016/j.jconrel.2022.11.022 (2022).
- Cover Article
17. **Kim B**, Yang Q, Chan LW, Bhatia S, Ruoslahti E, Sailor MJ. Fusogenic porous silicon nanoparticles as a broad-spectrum immunotherapy against bacterial infections. *Nanoscale Horiz.* doi: 10.1039/D0NH00624F (2021).
18. Kumeria T, Wang J, **Kim B**, Park J, Zuidema J, Klempner M, Cavacini L, Wang Y, Sailor MJ. Enteric Polymer-Coated Porous Silicon Nanoparticles for Site-Specific Oral Delivery of IgA Antibody. *ACS Biomater Sci Eng.* doi: 10.1021/acsbiomaterials.0c01313 (2020).
19. Robbiano V, Mariani S, Iglio R, La Mattina AA, Wang J, **Kim B**, Sailor MJ, Barillaro G. Moldless printing of silicone lenses with embedded nanostructured optical filters. *Adv Funct Mater* 30 (4), 1906836, doi: 10.1002/adfm.201906836 (2019).
20. **Kim B**, Park J, Sailor MJ., Rekindling RNAi Therapy: Materials Design Requirements for *In Vivo* siRNA Delivery. *Adv Mater* 1903637, doi: 10.1002/adma.201903637 (2019).
- Advanced Materials Hall of Fame
21. **Kim B**, Sun S, Varner JA, Howell SB, Ruoslahti E, Sailor MJ. Securing the Payload, Finding the Cell, Avoiding the Endosome: Peptide-Targeted, Fusogenic Porous Silicon Nanoparticles for More Effective Delivery of siRNA Therapies. *Adv Mater* 31, 1902952, doi: 10.1002/adma.201902952 (2019).
22. **Kim B**, Sailor MJ. Synthesis, Functionalization, and Characterization of Fusogenic Porous Silicon Nanoparticles for Oligonucleotide Delivery. *J Vis Exp*. (146), e59440, doi: 10.3791/59440 (2019).
23. **Kim B***, Pang H*, Kang J, Park J, Ruoslahti E, Sailor MJ. Immunogene therapy with fusogenic nanoparticles modulates macrophage response to Staphylococcus aureus. *Nat Commun* 9(1), 1969, doi: 10.1038/s41467-018-04390-7 (2018).
24. Hussain S, Joo J, Kang J, **Kim B**, Braun GB, She Z, Kim D, Mann AP, Mölder T, Teesalu T, Carnazza S, Guglielmino S, Sailor MJ, Ruoslahti E. Antibiotic-loaded nanoparticles targeted to the site of infection enhance antibacterial efficacy. *Nat Biomed Eng*, 2(2), 95-103, doi: 10.1038/s41551-017-0187-5 (2018).
25. Lee J, Kim J, Jeong M, Lee H, Goh U, Kim H, **Kim B**, Park JH. Liposome-based engineering of cells to package hydrophobic compounds in membrane vesicles for tumor penetration. *Nano Lett* 15, 2938-2944, doi: 10.1021/nl5047494 (2015).
26. Quan YH, **Kim B**, Park JH, Choi Y, Choi YH, Kim, HK. Highly sensitive and selective anticancer effect by conjugated HA-cisplatin in non-small cell lung cancer overexpressed with CD44. *Exp Lung Res* 40, 475-484, doi: 10.3109/01902148.2014.905656 (2014).
27. Saavedra SL, Teulier C, Smith BA, **Kim B**, Beutler BD, Martin BJ, Ulrich BD. Vibration-induced motor responses of infants with and without myelomeningocele. *Phys Ther* 92, 537-550, doi: 10.2522/ptj.20110074 (2012).

PATENTS

1. **Kim B**, Irvine D. Innate immune modulating RNA vaccines. US Pat. Appl. No. 63/728,284. Filed Dec 5, 2024.
2. **Kim B**, Irvine D. RNA-loaded lipid nanoparticle. US Pat. Appl. No. 63/506,661. Filed June 7, 2023.
3. Sailor MJ, **Kim B**, Kang J. 2015. Fusogenic liposome-coated porous silicon nanoparticles. US Patent US20200397698A1, July 6, 2020.

CONFERENCES

Invited Seminars

1. “Making better vaccines: Reprogramming Type I IFN to Unlock Vaccine Immunity”. *Center for Molecular Carcinogenesis and Toxicology (CMCT) Symposium*, Austin, TX, USA, December 2025.
2. “Engineering Immunity: Balancing Innate and Adaptive Responses in RNA Vaccines”. *UT Austin Cancer Research Center Retreat*, Austin, TX, USA, October 2025. ***Keynote Speaker**
3. “Engineering Immunity: From RNA Delivery Barriers to Next-Gen Vaccines”. *BME Department Seminar*, UT Austin, Austin, TX, USA, October 2025.
4. "Nanomedicine: Which Cancers To Treat". *Marble Seminar*, Koch Institute of MIT, Cambridge, MA, USA, October 2023.
5. “Stimulation vs. Inhibition: Role of Type 1 Interferon-mediated Recognition of Self-replicating RNA Vaccines”. *HMS Initiative for RNA Medicine (HIRM) Seminar*, Harvard Medical School (HMS), Cambridge, MA, USA, May 2023.
6. “Does Our Immune System Stimulate or Inhibit Self-replicating RNA Vaccines?” *Mechanisms and Barriers in Nanomedicine Conference.* Golden, CO, USA, May 2023.
7. “Chemistry for Cures: Making nano-scale materials for disease treatment,” *National Nanotechnology Initiative.* Online, Mar 2023.
8. “Engineering RNA vaccines for immunotherapy: Role of Type 1 Interferon-mediated Recognition of Self-replicating RNA Vaccines”*. Marble Seminar*, Koch Institute of MIT, Cambridge, MA, USA, July 2022.
9. “Inhibition vs. Stimulation: Role of Type 1 Interferon-mediated Recognition of Self-replicating RNA Vaccines”. *Ragon Seminar*, Ragon Institute, Cambridge, MA, USA, April 2022.
10. “RNA replicon-mediated immunotherapy against cancer and HIV,” *UNIST*, Online, Apr 2021.
11. “Fusogenic Porous Silicon Nanoparticles for Immunogene Therapy in Infections,” *Porous Semiconductors - Science and Technology (PSST).* Montpellier, France, Mar 2018.
    ***Keynote Speaker, *Lehman Prize for Best Seminar**

Oral Talks

1. “Role of the type 1 interferon response in humoral immunity elicited by self-replicating RNA vaccines,” *Biomedical Engineering Society (BMES).* Seattle, WA, USA, October 2023.
2. “Role of the type 1 interferon response in humoral immunity elicited by self-replicating RNA vaccines,” *Gordon Research Conference (GRC)- RNA Nanotechnology*. Ventura, CA, USA, January 2023.
3. “Role of the type 1 interferon response in humoral immunity elicited by self-replicating RNA vaccines,” *Gordon Research Seminar (GRS) - RNA Nanotechnology*. Ventura, CA, USA, January 2023.
4. “Tweaking the Immune System: fusogenic porous silicon nanoparticles for bacterial infection treatment,” *Biomedical Engineering Society (BMES).* Atlanta, GA, Oct 2018
   ***BMES Graduate Student Design and Research Award**
5. “Tweaking the Immune System: fusogenic porous silicon nanoparticles for bacterial infection treatment,” *Controlled Release Society (CRS)*. New York City, USA, July 2018.
6. “Fusogenic Liposome-coated Porous Silicon Nanoparticles for Delivery of Genes to Macrophages,” *Porous Semiconductors - Science and Technology (PSST).* Tarragona, Spain, Mar 2016.
7. “Fusogenic Liposomal Porous Silicon Nanoparticles as an Effective Gene Delivery System,” *The 5th Asian Silicon Symposium (ASIS).* Jeju, S. Korea, Oct 2015.

Poster Presentations

1. “Does Our Immune System Stimulate or Inhibit Self-replicating RNA Vaccines?” NanoDDS. Cambridge, MA, September 2023. ***Best Poster Award**
2. “Improving delivery of therapeutic self-replicating RNA to solid tumors via polysarcosine-conjugated LNPs” *Gordon Research Conference (GRC)- Cancer Nanotechnology.* Waterville, NH, June 2023.

3. "Does Our Immune System Stimulate or Inhibit Self-replicating RNA Vaccines?" *Mechanisms and Barriers in Nanomedicine Conference.* Golden, CO, May 2023. ***Best Poster Award**
4. "Role of the type 1 interferon response in humoral immunity elicited by self-replicating RNA vaccines," *Gordon Research Conference (GRC)- RNA Nanotechnology*. Ventura, CA, January 2023.
5. "Tweaking the Immune System: fusogenic porous silicon nanoparticles for bacterial infection treatment," *Biomedical Engineering Society (BMES)*. Atlanta, GA, Oct 2018
6. "Tweaking the Immune System: Targeted Fusogenic Nanoparticles for Immunogene Therapy against Bacterial Infection," Jacobs School of Engineering Research Expo. San Diego, CA, April 2017. ***Lee Rudee Outstanding Poster Award (1st out of >200), *Katie Osterday Best Poster**
7. "Liposomal Porous Silicon Nanoparticles as a Gene Delivery System," Jacobs School of Engineering Research Expo. San Diego, United States, April 2015.
8. "Liposomal Indicyanine Green as Diagnostic and Phototherapeuic Tool in Sentinel Lymph Nodes," *The Korean Society of Medical and Biological Engineering (KOSOMBE).* Incheon, S. Korea, Nov 2013. ***Best Poster Award**
9. "Liposomal Indicyanine Green as Diagnostic and Phototherapeuic Tool in Sentinel Lymph Nodes," *World Molecular Imaging Congress (WMIC).* Savannah, GA, Sept 2013.

HONORS

Fellowships/Scholarships

2025 Arthur and Sandra Irving Scholar, *Irving Cancer Immunology Symposium*
2022-2023 Convergence Scholar, Marble Center for Cancer Nanomedicine, *MIT*
2019 Dissertation Fellowship, *UCSD Jacobs School of Engineering*
2014 Graduate Student Fellowship, *UCSD Materials Science and Engineering Program*
2012-2014 KAIST Scholarship, *KAIST*

Conference Awards

2024 Travel Grant, *World Biomaterials Congress (WBC)* 2024
2023 First Place Lightning talk, *Duke Engineering Future Faculty of Innovation and Excellence*
2023 Best Poster Award, *NanoDDS 2023*
2023 Best Poster Award, *Mechanisms and Barriers in Nanomedicine Conference 2023*
2018 BMES Graduate Student Design and Research Award, *BMES 2018*
2018 Lehman Prize (best seminar across 7 conference days), *Porous Semiconductor Science and Technology (PSST) 2018*
2017 Lee Rudee Outstanding Poster Award (1st out of >200), *Jacobs Research Expo*
2017 Katie Osterday Mechanical and Aerospace Engineering Best Poster, *Jacobs Research Expo*
2013 Best Poster Award, *KOSOMBE 2013*

Distinctions

2025 Peg's Fight for Cancer Early Career Award*, A Breath of Hope Foundation*
2023 Peter Karches Mentorship Prize, *MIT*
2023 Rising Star, *Duke Engineering Future Faculty of Innovation and Excellence (DEFINE)*
2018 Invited Speaker, *Porous Semiconductor Science and Technology (PSST) 2018*
2018 Jacobs Graduate Student Council Award May 2018, *UCSD Jacobs School of Engineering*
2017 Gordon Scholar, *Gordon Engineering Leadership Center Scholars Program*
2011 University of Michigan Dean's Honor List for Academic Distinction, *University of Michigan*

Certification

2022 Kaufman Teaching Certificate, *MIT*