

Stanford



Mark A. Skylar-Scott

Assistant Professor of Bioengineering

CONTACT INFORMATION

• Administrative Contact

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Bio

ACADEMIC APPOINTMENTS

- Assistant Professor, Bioengineering
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Wu Tsai Neurosciences Institute

PATENTS

- Samuel G Rodrigues, Daniel Oran, Ruixuan Gao, Shoh Asano, Mark A Skylar-Scott, Fei Chen, Paul W Tillberg, Adam H Marblestone, Edward S Boyden. "United States Patent 11,214,661 Three-dimensional nanofabrication by patterning of hydrogels", Massachusetts Institute of Technology, Jan 4, 2022
- JA Lewis, MA Skylar-Scott, DB Kolesky, KA Homan, AHM Ng, GM Church. "United States Patent 11,214,768 Methods of generating functional human tissue", Harvard College, Jan 4, 2022
- JA Lewis, MA Skylar-Scott, J Mueller, D Kolesky. "United States Patent 10,946,588 Systems and methods for automated nozzle design and 3D printing", Harvard College, Harvard University, Mar 16, 2021
- Aaron K Remenschneider, Elliott Kozin, Nicole Leah Black, Michael J McKenna, Daniel J Lee, Jennifer A Lewis, John Rosowski, David B Kolesky, Mark A Skylar-Scott, Alexander D Valentine. "United States Patent 10,786,349 Artificial tympanic membrane devices and uses", Harvard College, Massachusetts Eye and Ear Infirmary, Jan 7, 2021
- Aaron K Remenschneider, Elliott Kozin, Nicole Leah Black, Michael J McKenna, Daniel J Lee, Jennifer A Lewis, John Rosowski, David B Kolesky, Mark A Skylar-Scott, Alexander D Valentine. "United States Patent 17/027,941 Artificial tympanic membrane devices and uses", Harvard College, Massachusetts Eye and Ear Infirmary, Jan 7, 2021
- JA Lewis, KA Homan, DB Kolesky, RL Truby, MA Skylar-Scott. "United States Patent 16/887,223 Tubular tissue construct and a method of printing", Harvard College, Nov 19, 2020
- M Skylar-Scott, S Uzel, J Lewis. "United States Patent 16/649,056 Tissue construct, methods of producing and using the same", Harvard College, Sep 17, 2020
- Kimberly A Homan, Navin R Gupta, Katharina T Kroll, David B Kolesky, Mark Skylar-Scott, Michael T Valerius, Joseph Bonventre, Ryuji Morizane, Jennifer Lewis. "United States Patent 16/620,225 Methods of enhancing development of renal organoids and methods of using the same", Harvard College, Brigham and Womens Hospital Inc, Aug 6, 2020
- Jennifer A Lewis, Kimberly A Homan, David B Kolesky, Ryan L Truby, Mark A Skylar-Scott. "United States Patent 10,702,630 Tubular tissue construct and a method of printing", Harvard College, Jul 7, 2020
- Katharina Theresa Kroll, Kimberly A Homan, Mark A Skylar-Scott, Sebastien GM Uzel, David B Kolesky, Patrick Lustenberger, Jennifer A Lewis. "United States Patent 16/631,677 Methods of producing multi-layered tubular tissue constructs", Harvard College, May 28, 2020

- JA Lewis, MA Skylar-Scott, J Mueller. "United States Patent 16/467,394 Valved nozzle with a compensator and massively parallel 3d printing system", Harvard College, Mar 19, 2020
- Jennifer A Lewis, David B Kolesky, Mark A Skylar-Scott, Kimberly A Homan, Ryan L Truby, Amelia Sydney Gladman. "United States Patent 16/143,050 Method of printing a tissue construct with embedded vasculature", Harvard College, Jan 24, 2019
- JA Lewis, DB Kolesky, MA Skylar-Scott, KA Homan, RL Truby, AS Gladman. "United States Patent 10,117,968 Method of printing a tissue construct with embedded vasculature", Harvard College, Nov 6, 2018

Teaching

COURSES

2024-25

- 3D Bioprinting Laboratory: BIOE 261 (Aut)
- Tissue Engineering: BIOE 260 (Spr)

2023-24

- 3D Bioprinting Laboratory: BIOE 261 (Win)
- Tissue Engineering: BIOE 260 (Spr)

2022-23

- 3D Bioprinting Laboratory: BIOE 261 (Win)
- Tissue Engineering: BIOE 260 (Spr)

2021-22

- Fundamentals for Engineering Biology Lab: BIOE 44 (Aut, Win)
- Tissue Engineering: BIOE 260 (Spr)

STANFORD ADVISEES

Med Scholar Project Advisor

Jessica Herrmann

Doctoral Dissertation Reader (AC)

Zinan Hu, John Klich, Callan Monette, Priya Nair, Michelle Tai, Jerry Yan

Postdoctoral Faculty Sponsor

Jianyi Du, Ju Yong Lee, Luca Rosalia, Dominic Ruetsche, Jeonghyun Son

Doctoral Dissertation Advisor (AC)

Yi Yi Du, Danielle Klinger, Annie Nguyen, Jack Rao, Joshua Sampson, Soham Sinha, Fredrik Samdal Solberg, Jonathan Weiss

Doctoral Dissertation Co-Advisor (AC)

Melissa Klein

Doctoral (Program)

Vin Armelin, Douglas Henze, Gokul Kannan, Samantha Mutiti, Abena Peasah, Joshua Sampson, Abhimanyu Sharma, Jonathan Weiss, Will Yu

Publications

PUBLICATIONS

- **A Low-Cost, Open-Source 3D Printer for Multimaterial and High-Throughput Direct Ink Writing of Soft and Living Materials.** *Advanced materials (Deerfield Beach, Fla.)*

- Weiss, J. D., Mermin-Bunnell, A., Solberg, F. S., Tam, T., Rosalia, L., Sharir, A., Rüttsche, D., Sinha, S., Choi, P. S., Shibata, M., Palagani, Y., Nilkant, R., Paulvannan, et al
2025: e2414971
- **Scalable Human iPSC-to-3D Bioprinting Pipeline: Successful Large-Scale Production Using Automated Bioreactor Systems**
Ladi, R., Ho, D., Lee, S., Du, J., Weiss, J., Tam, T., Sinha, S., Klinger, D., Devine, S., Hamfeldt, A., Leng, H., Herrmann, J., He, et al
CELL PRESS.2024: 640
 - **A Visual, In-Expensive, and Wireless Capillary Rheometer for Characterizing Wholly-Cellular Bioinks.** *Small (Weinheim an der Bergstrasse, Germany)*
Du, J., Lee, S., Sinha, S., Solberg, F. S., Ho, D. L., Sampson, J. P., Wang, Q., Tam, T., Skylar-Scott, M. A.
2023: e2304778
 - **Rapid model-guided design of organ-scale synthetic vasculature for biomanufacturing.** *ArXiv*
Sexton, Z. A., Hudson, A. R., Herrmann, J. E., Shiwerski, D. J., Pham, J., Szafron, J. M., Wu, S. M., Skylar-Scott, M., Feinberg, A. W., Marsden, A.
2023
 - **Special Issue on Biofabrication with Spheroid and Organoid Materials.** *Acta biomaterialia*
Skylar-Scott, M., Declercq, H., Nakayama, K.
2023
 - **Large-Scale Production of Wholly-Cellular Bioinks via the Optimization of Human Induced Pluripotent Stem Cell Aggregate Culture in Automated Bioreactors.** *Advanced healthcare materials*
Ho, D. L., Lee, S., Du, J., Weiss, J. D., Tam, T., Sinha, S., Klinger, D., Devine, S., Hamfeldt, A., Leng, H. T., Herrmann, J. E., He, M., Fradkin, et al
2022: e2201138
 - **How collaboration between bioethicists and neuroscientists can advance research.** *Nature neuroscience*
Hyun, I., Scharf-Deering, J. C., Sullivan, S., Aach, J. D., Arlotta, P., Baum, M. L., Church, G. M., Goldenberg, A., Greely, H. T., Khoshakhlagh, P., Kohman, R. E., Lopes, M., Lowenthal, et al
2022
 - **Biomanufacturing human tissues via organ building blocks.** *Cell stem cell*
Wolf, K. J., Weiss, J. D., Uzel, S. G., Skylar-Scott, M. A., Lewis, J. A.
2022; 29 (5): 667-677
 - **Programming Cellular Alignment in Engineered Cardiac Tissue via Bioprinting Anisotropic Organ Building Blocks.** *Advanced materials (Deerfield Beach, Fla.)*
Ahrens, J., Uzel, S., Skylar-Scott, M., Mata, M., Lu, A., Kroll, K., Lewis, J. A.
2022: e2200217
 - **BIOMANUFACTURING OF PERFUSABLE ENGINEERED CARDIAC TISSUES**
Uzel, S., Skylar-Scott, M., Lu, A., Lewis, J.
MARY ANN LIEBERT, INC.2022: S248
 - **Orthogonally induced differentiation of stem cells for the programmatic patterning of vascularized organoids and bioprinted tissues.** *Nature biomedical engineering*
Skylar-Scott, M. A., Huang, J. Y., Lu, A., Ng, A. H., Duenki, T., Liu, S., Nam, L. L., Damaraju, S., Church, G. M., Lewis, J. A.
2022
 - **Bioprinted microvasculature: progressing from structure to function.** *Biofabrication*
Seymour, A. J., Westerfield, A. D., Cornelius, V. C., Skylar-Scott, M. A., Heilshorn, S.
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 - **Reconstructing the heart using iPSCs: Engineering strategies and applications.** *Journal of molecular and cellular cardiology*
Cho, S., Lee, C., Skylar-Scott, M. A., Heilshorn, S. C., Wu, J. C.
2021
 - **Flow-enhanced vascularization and maturation of kidney organoids in vitro** *NATURE METHODS*
Homan, K. A., Gupta, N., Kroll, K. T., Kolesky, D. B., Skylar-Scott, M., Miyoshi, T., Mau, D., Valerius, M., Ferrante, T., Bonventre, J. V., Lewis, J. A., Morizane, R.
2019; 16 (3): 255-+

- **Voxelated soft matter via multimaterial multinozzle 3D printing.** *Nature*
Skylar-Scott, M. A., Mueller, J. n., Visser, C. W., Lewis, J. A.
2019; 575 (7782): 330–35
- **Biomanufacturing of organ-specific tissues with high cellular density and embedded vascular channels.** *Science advances*
Skylar-Scott, M. A., Uzel, S. G., Nam, L. L., Ahrens, J. H., Truby, R. L., Damaraju, S. n., Lewis, J. A.
2019; 5 (9): eaaw2459
- **In Vitro Human Tissues via Multi-material 3-D Bioprinting** *ATLA-ALTERNATIVES TO LABORATORY ANIMALS*
Kolesky, D. B., Homan, K. A., Skylar-Scott, M., Lewis, J. A.
2018; 46 (4): 209–15
- **3D printed structures for modeling the Young's modulus of bamboo parenchyma** *ACTA BIOMATERIALIA*
Dixon, P. G., Muth, J. T., Xiao, X., Skylar-Scott, M. A., Lewis, J. A., Gibson, L. J.
2018; 68: 90-98
- **3D nanofabrication by volumetric deposition and controlled shrinkage of patterned scaffolds.** *Science (New York, N.Y.)*
Oran, D. n., Rodrigues, S. G., Gao, R. n., Asano, S. n., Skylar-Scott, M. A., Chen, F. n., Tillberg, P. W., Marblestone, A. H., Boyden, E. S.
2018; 362 (6420): 1281–85
- **Multi-photon microfabrication of three-dimensional capillary-scale vascular networks**
Skylar-Scott, M. A., Liu, M., Wu, Y., Yanik, M., VonFreyman, G., Schoenfeld, W. V., Rumpf, R. C.
SPIE-INT SOC OPTICAL ENGINEERING.2017
- **Bioprinting of 3D Convoluted Renal Proximal Tubules on Perfusable Chips** *SCIENTIFIC REPORTS*
Homan, K. A., Kolesky, D. B., Skylar-Scott, M. A., Herrmann, J., Obuobi, H., Moisan, A., Lewis, J. A.
2016; 6: 34845
- **Laser-assisted direct ink writing of planar and 3D metal architectures** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Skylar-Scott, M. A., Gunasekaran, S., Lewis, J. A.
2016; 113 (22): 6137–42
- **Guided Homing of Cells in Multi-Photon Microfabricated Bioscaffolds** *ADVANCED HEALTHCARE MATERIALS*
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2016; 5 (10): 1233–43
- **Three-dimensional bioprinting of thick vascularized tissues** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Kolesky, D. B., Homan, K. A., Skylar-Scott, M. A., Lewis, J. A.
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- **Synchronous Symmetry Breaking in Neurons with Different Neurite Counts** *PLOS ONE*
Wissner-Gross, Z. D., Scott, M. A., Steinmeyer, J. D., Yanik, M.
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- **Electrokinetic confinement of axonal growth for dynamically configurable neural networks** *LAB ON A CHIP*
Honegger, T., Scott, M. A., Yanik, M. F., Voldman, J.
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- **Ultra-rapid laser protein micropatterning: screening for directed polarization of single neurons** *LAB ON A CHIP*
Scott, M. A., Wissner-Gross, Z. D., Yanik, M.
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- **Synapse microarray identification of small molecules that enhance synaptogenesis** *NATURE COMMUNICATIONS*
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- **Large-scale analysis of neurite growth dynamics on micropatterned substrates** *INTEGRATIVE BIOLOGY*
Wissner-Gross, Z. D., Scott, M. A., Ku, D., Ramaswamy, P., Yanik, M.

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- **Construction of a femtosecond laser microsurgery system** *NATURE PROTOCOLS*
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- **Visor Scratch Repair and Prevention** *The Journal of Conventional Weapons Destruction*
Heafitz, A., Linder, B., Luczynska, M., Scott, M.
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