




Sarah Heilshorn

Director, Geballe Laboratory for Advanced Materials (GLAM), Professor of Materials Science and Engineering and, by courtesy, of Bioengineering and of Chemical Engineering

 NIH Biosketch available Online

 Curriculum Vitae available Online

CONTACT INFORMATION

• Administrator

Naomi Tudor - Administrative Associate

Email ntudor@stanford.edu

Bio

BIO

Heilshorn's interests include biomaterials in regenerative medicine, engineered proteins with novel assembly properties, microfluidics and photolithography of proteins, and synthesis of materials to influence stem cell differentiation. Current projects include tissue engineering for spinal cord and blood vessel regeneration, designing injectable materials for use in stem cell therapies, and the design of microfluidic devices to study the directed migration of cells (i.e., chemotaxis).

ACADEMIC APPOINTMENTS

- Professor, Materials Science and Engineering
- Professor (By courtesy), Bioengineering
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Maternal & Child Health Research Institute (MCHRI)
- Affiliate, Precourt Institute for Energy
- Faculty Fellow, Sarafan ChEM-H
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- New Innovator Award, National Institutes of Health (2009)
- CAREER Award, National Science Foundation (2009)
- New Investigator Award, Petroleum Research Fund, American Chemical Society (2009)

PROFESSIONAL EDUCATION

- PhD, Caltech , Chemical Engineering (2004)
- MS, Caltech , Chemical Engineering (2000)
- BS, Georgia Tech , Chemical Engineering (1998)

LINKS

- Heilshorn Laboratory Site: <https://web.stanford.edu/group/heilshorn/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Protein engineering
Tissue engineering
Regenerative medicine
Biomaterials

Teaching

COURSES

2021-22

- Biomaterials in Regenerative Medicine: BIOE 361, MATSCI 381 (Spr)
- Introduction to Materials Science, Biomaterials Emphasis: ENGR 50M (Aut)
- Introduction to Materials Science, Energy Emphasis: ENGR 50E (Win)
- Introductory Science of Materials: OSPBER 50M (Aut, Win, Spr)
- Introductory Science of Materials: OSPFLOR 50M (Win)
- Introductory Science of Materials: OSPPARIS 50M (Aut, Win)

2020-21

- Biomaterials in Regenerative Medicine: BIOE 361, MATSCI 381 (Spr)
- Introduction to Materials Science, Biomaterials Emphasis: ENGR 50M (Aut)

2019-20

- Bioengineering Materials to Heal the Body: MATSCI 81N (Spr)
- Biomaterials in Regenerative Medicine: BIOE 361, MATSCI 381 (Aut)
- Introduction to Materials Science, Biomaterials Emphasis: ENGR 50M (Win)
- Introductory Science of Materials: OSPBER 50M (Aut, Win)
- Introductory Science of Materials: OSPFLOR 50M (Win)
- Introductory Science of Materials: OSPPARIS 50M (Win)

2018-19

- Bioengineering Materials to Heal the Body: MATSCI 81N (Aut)
- Biomaterials in Regenerative Medicine: BIOE 361, MATSCI 381 (Spr)
- Introduction to Materials Science, Biomaterials Emphasis: ENGR 50M (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Frank Charbonier, John Eugenis, Abby Grosskopf, Payton Marshall, Sauradeep Sinha

Postdoctoral Faculty Sponsor

Aidan Gilchrist, Kelsea Hubka, Patrik Johansson, Renato Navarro, Jolien Pas

Doctoral Dissertation Advisor (AC)

Neil Baugh, Lucia Brunel, Betty Cai, Vincent Cornelius, Michelle Huang, Bauer LeSavage, Yueming Liu, Chris Long, Narelli Paiva, Julien Roth, Alexis Seymour

Orals Evaluator

Catie Kasse

Master's Program Advisor

Harvey Cai, JIU-AN PAN

Doctoral Dissertation Co-Advisor (AC)

Pam Cai, Marina Chang, Sarah Hull, Anton Molina

Doctoral (Program)

Eddie Barks, Marina Chang, Abhinav Parakh, Wen Zhang

Postdoctoral Research Mentor

Aidan Gilchrist

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (Phd Program)
- Stem Cell Biology and Regenerative Medicine (Phd Program)

Publications

PUBLICATIONS

- **Engineered assistive materials for 3D bioprinting: support baths and sacrificial inks.** *Biofabrication*
Brunel, L. G., Hull, S. M., Heilshorn, S.
2022
- **Hyaluronan and elastin-like protein (HELP) gels significantly improve microsphere retention in the myocardium.** *Biomaterials science*
Suhar, R. A., Doulames, V. M., Liu, Y., Hefferon, M. E., Figueroa, O. 3., Buabbas, H., Heilshorn, S. C.
2022
- **Tuning Polymer Hydrophilicity to Regulate Gel Mechanics and Encapsulated Cell Morphology.** *Advanced healthcare materials*
Navarro, R. S., Huang, M. S., Roth, J. G., Hubka, K. M., Long, C. M., Enejder, A., Heilshorn, S. C.
2022: e2200011
- **Bioprinted microvasculature: progressing from structure to function.** *Biofabrication*
Seymour, A. J., Westerfield, A. D., Cornelius, V. C., Skylar-Scott, M. A., Heilshorn, S.
1800
- **A human multi-lineage hepatic organoid model for liver fibrosis.** *Nature communications*
Guan, Y., Enejder, A., Wang, M., Fang, Z., Cui, L., Chen, S., Wang, J., Tan, Y., Wu, M., Chen, X., Johansson, P. K., Osman, I., Kunimoto, et al
2021; 12 (1): 6138
- **3D Bioprinting of Cell-Laden Hydrogels for Improved Biological Functionality.** *Advanced materials (Deerfield Beach, Fla.)*
Hull, S. M., Brunel, L. G., Heilshorn, S. C.
2021: e2103691
- **Elastin-like Proteins to Support Peripheral Nerve Regeneration in Guidance Conduits.** *ACS biomaterials science & engineering*
Suhar, R. A., Marquardt, L. M., Song, S., Buabbas, H., Doulames, V. M., Johansson, P. K., Klett, K. C., Dewi, R. E., Enejder, A. M., Plant, G. W., George, P. M., Heilshorn, S. C.
2021; 7 (9): 4209-4220
- **Cancer-associated mesothelial cells promote ovarian cancer chemoresistance through paracrine osteopontin signaling.** *The Journal of clinical investigation*
Qian, J., LeSavage, B. L., Hubka, K. M., Ma, C., Natarajan, S., Eggold, J. T., Xiao, Y., Fuh, K. C., Krishnan, V., Enejder, A., Heilshorn, S. C., Dorigo, O., Rankin, et al
2021; 131 (16)

- **Next-generation cancer organoids.** *Nature materials*
LeSavage, B. L., Suhar, R. A., Broguiere, N., Lutolf, M. P., Heilshorn, S. C.
2021
- **Advancing models of neural development with biomaterials.** *Nature reviews. Neuroscience*
Roth, J. G., Huang, M. S., Li, T. L., Feig, V. R., Jiang, Y., Cui, B., Greely, H. T., Bao, Z., Pasca, S. P., Heilshorn, S. C.
2021
- **3D Printing of Microgel Scaffolds with Tunable Void Fraction to Promote Cell Infiltration.** *Advanced healthcare materials*
Seymour, A. J., Shin, S., Heilshorn, S. C.
2021: e2100644
- **Bio-orthogonally Crosslinked Matrix Therapies for Corneal Defect Repair**
Myung, D., Chen, F., Fernandes-Cunha, G., Le, P., Hull, S., Heilshorn, S.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021
- **Physical Properties of COVID-19 Acute Respiratory Distress Syndrome (ARDS) Sputum**
Pacheco-Navarro, A., Kratochvil, M. J., Kaber, G., Roque, J., Blish, C., Yang, S., Nadeau, K. C., Heilshorn, S. C., Milla, C. E., Rogers, A., Bollyky, P.
AMER THORACIC SOC.2021
- **Engineered Matrices Enable the Culture of Human Patient-Derived Intestinal Organoids.** *Advanced science (Weinheim, Baden-Wurttemberg, Germany)*
Hunt, D. R., Klett, K. C., Mascharak, S., Wang, H., Gong, D., Lou, J., Li, X., Cai, P. C., Suhar, R. A., Co, J. Y., LeSavage, B. L., Foster, A. A., Guan, et al
2021; 8 (10): 2004705
- **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
- **Engineered Matrices Enable the Culture of Human Patient-Derived Intestinal Organoids** *ADVANCED SCIENCE*
Hunt, D. R., Klett, K. C., Mascharak, S., Wang, H. Y., Gong, D., Lou, J., Li, X., Cai, P. C., Suhar, R. A., Co, J. Y., LeSavage, B. L., Foster, A. A., Guan, et al
2021
- **3D Bioprinting using UNiversal Orthogonal Network (UNION) Bioinks.** *Advanced functional materials*
Hull, S. M., Lindsay, C. D., Brunel, L. G., Shiwerski, D. J., Tashman, J. W., Roth, J. G., Myung, D., Feinberg, A. W., Heilshorn, S. C.
2021; 31 (7)
- **Microrheology reveals simultaneous cell-mediated matrix stiffening and fluidization that underlie breast cancer invasion.** *Science advances*
Krajina, B. A., LeSavage, B. L., Roth, J. G., Zhu, A. W., Cai, P. C., Spakowitz, A. J., Heilshorn, S. C.
2021; 7 (8)
- **Dynamic light scattering microrheology for soft and living materials.** *Soft matter*
Cai, P. C., Krajina, B. A., Kratochvil, M. J., Zou, L., Zhu, A., Burgener, E. B., Bollyky, P. L., Milla, C. E., Webber, M. J., Spakowitz, A. J., Heilshorn, S. C.
2021
- **Defined matrices bring IBD to 3D.** *Nature materials*
LeSavage, B. L., Heilshorn, S. C.
2021; 20 (2): 124–25
- **Transforming Growth Factor Induced Protein Promotes NF-Kappa-B Mediated Angiogenesis During Postnatal Lung Development.** *American journal of respiratory cell and molecular biology*
Liu, M., Iosef, C., Rao, S., Domingo-Gonzalez, R., Fu, S., Snider, P., Conway, S. J., Umbach, G. S., Heilshorn, S. C., Dewi, R. E., Dahl, M. J., Null, D. M., Albertine, et al
2020
- **3D Bioprinting using UNiversal Orthogonal Network (UNION) Bioinks** *ADVANCED FUNCTIONAL MATERIALS*
Hull, S. M., Lindsay, C. D., Brunel, L. G., Shiwerski, D. J., Tashman, J. W., Roth, J. G., Myung, D., Feinberg, A. W., Heilshorn, S. C.
2020
- **Neural Progenitor Cells Alter Chromatin Organization and Neurotrophin Expression in Response to 3D Matrix Degradability.** *Advanced healthcare materials*

Madl, C. M., LeSavage, B. L., Khariton, M., Heilshorn, S. C.
2020; e2000754

- **Bioengineered, In Situ-Crosslinked Collagen Gels for Suture-Free Stromal Defect Reconstruction of the Cornea**
Myung, D., Djalilian, A. R., Heilshorn, S., Chen, F., Le, P., Hull, S., Fernandes-Cunha, G., Na, K.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Designer, injectable gels to prevent transplanted Schwann cell loss during spinal cord injury therapy.** *Science advances*
Marquardt, L. M., Doulames, V. M., Wang, A. T., Dubbin, K., Suhar, R. A., Kratochvil, M. J., Medress, Z. A., Plant, G. W., Heilshorn, S. C.
2020; 6 (14): eaaz1039
- **Materials for blood brain barrier modeling in vitro.** *Materials science & engineering. R, Reports : a review journal*
Ferro, M. P., Heilshorn, S. C., Owens, R. M.
2020; 140
- **Materials for blood brain barrier modeling in vitro** *MATERIALS SCIENCE & ENGINEERING R-REPORTS*
Ferro, M. P., Heilshorn, S. C., Owens, R. M.
2020; 140
- **Engineering the Microenvironment for Heart Muscle Cell Mechanobiology**
Castillo, E. A., Lane, K., Chirikian, O., Feinstein, S., Blair, C., Schroer, A., Pardon, G., Grancharova, T., Gunawardane, R., Heilshorn, S., Pruitt, B. L.
CELL PRESS.2020: 154A
- **Bio-orthogonally crosslinked hyaluronate-collagen hydrogel for suture-free corneal defect repair.** *Biomaterials*
Chen, F. n., Le, P. n., Fernandes-Cunha, G. M., Heilshorn, S. C., Myung, D. n.
2020; 255: 120176
- **Bioprinting Cell- and Spheroid-Laden Protein-Engineered Hydrogels as Tissue-on-Chip Platforms.** *Frontiers in bioengineering and biotechnology*
Duarte Campos, D. F., Lindsay, C. D., Roth, J. G., LeSavage, B. L., Seymour, A. J., Krajina, B. A., Ribeiro, R. n., Costa, P. F., Blaeser, A. n., Heilshorn, S. C.
2020; 8: 374
- **Weekly injection of IL-2 using an injectable hydrogel reduces autoimmune diabetes incidence in NOD mice.** *Diabetologia*
Nagy, N. n., Kaber, G. n., Kratochvil, M. J., Kuipers, H. F., Ruppert, S. M., Yadava, K. n., Yang, J. n., Heilshorn, S. C., Long, S. A., Pugliese, A. n., Bollyky, P. L.
2020
- **THE HYPOXIC TUMOR-MESOTHELIAL NICHE PROMOTES OVARIAN CANCER METASTASIS THROUGH COLLAGEN REMODELING**
Natarajan, S., Foreman, K., Soriano, M., Shehade, H., Fregoso, D., Eggold, J., Rosen, N. S., Heilshorn, S., Krieg, A. J., Krishnan, V., Dorigo, O., Sinha, S., Fuh, et al
AMER ASSOC CANCER RESEARCH.2019: 168
- **Rapid Diels-Alder Cross-linking of Cell Encapsulating Hydrogels** *CHEMISTRY OF MATERIALS*
Madl, C. M., Heilshorn, S. C.
2019; 31 (19): 8035–43
- **Rapid Diels-Alder Cross-linking of Cell Encapsulating Hydrogels.** *Chemistry of materials : a publication of the American Chemical Society*
Madl, C. M., Heilshorn, S. C.
2019; 31 (19): 8035-8043
- **Bioprinting of stem cell expansion lattices** *ACTA BIOMATERIALIA*
Lindsay, C. D., Roth, J. G., LeSavage, B. L., Heilshorn, S. C.
2019; 95: 225–35
- **Engineered materials for organoid systems.** *Nature reviews. Materials*
Kratochvil, M. J., Seymour, A. J., Li, T. L., Pasca, S. P., Kuo, C. J., Heilshorn, S. C.
2019; 4 (9): 606–622
- **Engineered materials for organoid systems** *NATURE REVIEWS MATERIALS*
Kratochvil, M. J., Seymour, A. J., Li, T. L., Pasca, S. P., Kuo, C. J., Heilshorn, S. C.
2019; 4 (9): 606–22

- **Adaptable protein-engineered hydrogels for organoid culture**
Heilshorn, S.
AMER CHEMICAL SOC.2019
- **Characterization of bioorthogonally crosslinked collagen gels with encapsulated corneal stromal stem cells**
Hull, S., Fernandes-Cunha, G., Putra, I., Eslani, M., Djalilian, A. R., Heilshorn, S., Myung, D.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Smart Bioinks as de novo Building Blocks to Bioengineer Living Tissues.** *Gels (Basel, Switzerland)*
Blaeser, A., Heilshorn, S. C., Duarte Campos, D. F.
2019; 5 (2)
- **Collagen Remodeling in the Hypoxic Tumor-Mesothelial Niche Promotes Ovarian Cancer Metastasis** *CANCER RESEARCH*
Natarajan, S., Foreman, K. M., Soriano, M., Rossen, N. S., Shehade, H., Fregoso, D. R., Eggold, J. T., Krishnan, V., Dorigo, O., Krieg, A. J., Heilshorn, S. C., Sinha, S., Fuh, et al
2019; 79 (9): 2271–84
- **Biomimetic polymers as custom bioinks for 3D printing**
Heilshorn, S.
AMER CHEMICAL SOC.2019
- **Matrix Remodeling Enhances the Differentiation Capacity of Neural Progenitor Cells in 3D Hydrogels** *ADVANCED SCIENCE*
Madl, C. M., LeSavage, B. L., Dewi, R. E., Lampe, K. J., Heilshorn, S. C.
2019; 6 (4): 1801716
- **A definition of bioinks and their distinction from biomaterial inks** *BIOFABRICATION*
Groll, J., Burdick, J. A., Cho, D., Derby, B., Gelinsky, M., Heilshorn, S. C., Juengst, T., Malda, J., Mironov, V. A., Nakayama, K., Ovsianikov, A., Sun, W., Takeuchi, et al
2019; 11 (1): 013001
- **Antibiofilm elastin-like polypeptide coatings: functionality, stability, and selectivity** *ACTA BIOMATERIALIA*
Atefyekta, S., Pihl, M., Lindsay, C., Heilshorn, S. C., Andersson, M.
2019; 83: 245-256
- **Shear Thinning Hydrogel-based 3D Tissue Modelling** *BIOFABRICATION AND 3D TISSUE MODELING*
Lindsay, C. D., Heilshorn, S. C., Cho, D. W.
2019; 3: 94–118
- **Bioprinting of stem cell expansion lattices.** *Acta biomaterialia*
Lindsay, C. D., Roth, J. G., LeSavage, B. L., Heilshorn, S. C.
2019
- **Antibiofilm elastin-like polypeptide coatings: functionality, stability, and selectivity.** *Acta biomaterialia*
Atefyekta, S., Pihl, M., Lindsay, C., Heilshorn, S. C., Andersson, M.
2019; 83: 245–56
- **An in Vivo miRNA Delivery System for Restoring Infarcted Myocardium.** *ACS nano*
Yang, H. n., Qin, X. n., Wang, H. n., Zhao, X. n., Liu, Y. n., Wo, H. T., Liu, C. n., Nishiga, M. n., Chen, H. n., Ge, J. n., Sayed, N. n., Abilez, O. J., Ding, et al
2019
- **Interrogating extracellular matrix remodeling by breast cancer spheroids using dynamic light scattering microrheology.**
Krajina, B. A., Zhu, A., Spakowitz, A. J., Heilshorn, S. C.
AMER SOC CELL BIOLOGY.2018
- **Engineering Regenerative Thymic Tissues to Restore Long-Term T Cell Lymphopoiesis**
Gai, H., Gras-Pena, R., Verma, Y., Fateh, V., Ikeda, K., Dejene, B., Min, D., Wang, J., Swigut, T., Weinberg, K. I., Hollander, G. A., Heilshorn, S., Roncarolo, et al
AMER SOC HEMATOLOGY.2018
- **Tuning Bulk Hydrogel Degradation by Simultaneous Control of Proteolytic Cleavage Kinetics and Hydrogel Network Architecture.** *ACS macro letters*
Madl, C. M., Katz, L. M., Heilshorn, S. C.

2018; 7 (11): 1302-1307

- **Tuning Bulk Hydrogel Degradation by Simultaneous Control of Proteolytic Cleavage Kinetics and Hydrogel Network Architecture** *ACS MACRO LETTERS*
Madl, C. M., Katz, L. M., Heilshorn, S. C.
2018; 7 (11): 1302–7
- **Active DNA Olympic Hydrogels Driven by Topoisomerase Activity.** *Physical review letters*
Krajina, B. A., Zhu, A., Heilshorn, S. C., Spakowitz, A. J.
2018; 121 (14): 148001
- **Active DNA Olympic Hydrogels Driven by Topoisomerase Activity** *PHYSICAL REVIEW LETTERS*
Krajina, B. A., Zhu, A., Heilshorn, S. C., Spakowitz, A. J.
2018; 121 (14)
- **Engineered stem cell mimics to enhance stroke recovery** *BIOMATERIALS*
George, P. M., Oh, B., Dewi, R., Hua, T., Cai, L., Levinson, A., Liang, X., Krajina, B. A., Bliss, T. M., Heilshorn, S. C., Steinberg, G. K.
2018; 178: 63–72
- **Polymers at the Interface with Biology** *BIOMACROMOLECULES*
Deming, T. J., Klok, H., Armes, S. P., Becker, M. L., Champion, J. A., Chen, E., Heilshorn, S. C., van Hest, J. M., Irvine, D. J., Johnson, J. A., Kiessling, L. L., Maynard, H. D., de la Cruz, et al
2018; 19 (8): 3151–62
- **Tunable Control of Hydrogel Microstructure by Kinetic Competition between Self-Assembly and Crosslinking of Elastin-like Proteins** *ACS APPLIED MATERIALS & INTERFACES*
Wang, H., Paul, A., Duong Nguyen, Enejder, A., Heilshorn, S. C.
2018; 10 (26): 21808–15
- **Investigating the interplay between substrate stiffness and ligand chemistry in directing mesenchymal stem cell differentiation within 3D macro-porous substrates.** *Biomaterials*
Haugh, M. G., Vaughan, T. J., Madl, C. M., Raftery, R. M., McNamara, L. M., O'Brien, F. J., Heilshorn, S. C.
2018; 171: 23–33
- **Investigating the interplay between substrate stiffness and ligand chemistry in directing mesenchymal stem cell differentiation within 3D macro-porous substrates** *BIOMATERIALS*
Haugh, M. G., Vaughan, T. J., Madl, C. M., Raftery, R. M., McNamara, L. M., O'Brien, F. J., Heilshorn, S. C.
2018; 171: 23-33
- **Effects of engineered cellular microenvironments on the secretome of human mesenchymal stem cells**
Hull, S., Fernandes-Cunha, G., Lee, H., Heilshorn, S., Myung, D.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Mechanical properties of collagen gels crosslinked by copper-free click chemistry and their effects on encapsulated keratocytes**
Lee, H., Fernandes-Cunha, G., Heilshorn, S., Myung, D.
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Engineering Hydrogel Microenvironments to Recapitulate the Stem Cell Niche.** *Annual review of biomedical engineering*
Madl, C. M., Heilshorn, S. C.
2018; 20: 21–47
- **Review: Bioengineering strategies to probe T cell mechanobiology.** *APL bioengineering*
de la Zerda, A., Kratochvil, M. J., Suhar, N. A., Heilshorn, S. C.
2018; 2 (2): 021501
- **Review: Bioengineering strategies to probe T cell mechanobiology** *APL BIOENGINEERING*
de la Zerda, A., Kratochvil, M. J., Suhar, N. A., Heilshorn, S. C.
2018; 2 (2)
- **Dynamic Hyaluronan Hydrogels with Temporally Modulated High Injectability and Stability Using a Biocompatible Catalyst** *ADVANCED MATERIALS*
Lou, J., Liu, F., Lindsay, C. D., Chaudhuri, O., Heilshorn, S. C., Xia, Y.

2018; 30 (22)

- **Production of Elastin-like Protein Hydrogels for Encapsulation and Immunostaining of Cells in 3D.** *Journal of visualized experiments : JoVE*
LeSavage, B. L., Suhar, N. A., Madl, C. M., Heilshorn, S. C.
2018
- **Bioengineering strategies to accelerate stem cell therapeutics** *NATURE*
Madl, C. M., Heilshorn, S. C., Blau, H. M.
2018; 557 (7705): 335–42
- **Dynamic Hyaluronan Hydrogels with Temporally Modulated High Injectability and Stability Using a Biocompatible Catalyst.** *Advanced materials (Deerfield Beach, Fla.)*
Lou, J., Liu, F., Lindsay, C. D., Chaudhuri, O., Heilshorn, S. C., Xia, Y.
2018; 30 (22): e1705215
- **Production of Elastin-like Protein Hydrogels for Encapsulation and Immunostaining of Cells in 3D** *JOVE-JOURNAL OF VISUALIZED EXPERIMENTS*
LeSavage, B. L., Suhar, N. A., Madl, C. M., Heilshorn, S. C.
2018
- **Protein engineering of multi-functional biomaterials for regenerative medicine**
Heilshorn, S.
AMER CHEMICAL SOC.2018
- **Bioorthogonal Strategies for Engineering Extracellular Matrices** *ADVANCED FUNCTIONAL MATERIALS*
Madl, C. M., Heilshorn, S. C.
2018; 28 (11)
- **Bioorthogonal Strategies for Engineering Extracellular Matrices.** *Advanced functional materials*
Madl, C. M., Heilshorn, S. C.
2018; 28 (11)
- **Protein-engineered hydrogels enhance the survival of induced pluripotent stem cell-derived endothelial cells for treatment of peripheral arterial disease** *BIOMATERIALS SCIENCE*
Foster, A. A., Dewi, R. E., Cai, L., Hou, L., Strassberg, Z., Alcazar, C. A., Heilshorn, S. C., Huang, N. F.
2018; 6 (3): 614–22
- **Interrogating Cell-Mediated Remodeling of the Extracellular Matrix by Dynamic Light Scattering Microrheology**
Krajina, B. A., Zhu, A., Heilshorn, S. C., Spakowitz, A. J.
CELL PRESS.2018: 371A–372A
- **Engineered stem cell mimics to enhance stroke recovery.** *Biomaterials*
George, P. M., Oh, B. n., Dewi, R. n., Hua, T. n., Cai, L. n., Levinson, A. n., Liang, X. n., Krajina, B. A., Bliss, T. M., Heilshorn, S. C., Steinberg, G. K.
2018; 178: 63–72
- **Engineering Hydrogel Microenvironments to Recapitulate the Stem Cell Niche** *ANNUAL REVIEW OF BIOMEDICAL ENGINEERING, VOL 20*
Madl, C. M., Heilshorn, S. C., Yamush, M. L.
2018; 20: 21-47
- **Biotemplated synthesis of inorganic materials: An emerging paradigm for nanomaterial synthesis inspired by nature** *PROGRESS IN MATERIALS SCIENCE*
Krajina, B. A., Proctor, A. C., Schoen, A. P., Spakowitz, A. J., Heilshorn, S. C.
2018; 91: 1–23
- **Dynamic Light Scattering Microrheology Reveals Multiscale Viscoelasticity of Polymer Gels and Precious Biological Materials** *ACS CENTRAL SCIENCE*
Krajina, B. A., Tropini, C., Zhu, A., DiGiacomo, P., Sonnenburg, J. L., Heilshorn, S. C., Spakowitz, A. J.
2017; 3 (12): 1294–1303
- **Adaptable hydrogels with secondary reinforcement for regenerative medicine**
Heilshorn, S., Wang, H.
AMER CHEMICAL SOC.2017

- **Recombinant biomaterials for treatment of spinal cord injuries**
Dubbin, K., Marquardt, L., Plant, G., Heilshorn, S.
AMER CHEMICAL SOC.2017
- **Peptide-crosslinking of biomaterials for 3D bio-printing**
Heilshorn, S., Dubbin, K.
AMER CHEMICAL SOC.2017
- **Polypeptide scaffolds as engineered neural stem cell niches**
Madl, C., Heilshorn, S.
AMER CHEMICAL SOC.2017
- **Covalently adaptable elastin-like protein - hyaluronic acid (ELP - HA) hybrid hydrogels with secondary thermoresponsive crosslinking for injectable stem cell delivery.** *Advanced functional materials*
Wang, H., Zhu, D., Paul, A., Cai, L., Enejder, A., Yang, F., Heilshorn, S. C.
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