

Jessica E. Snyder, PhD

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Engineer and explorer seeking an ambitious team to build, as much as evolve, biological industrial design

Work Experience

Odyssey SpaceWorks, *Cofounder/Head of Science* (2022-present) *Build and operate an automated R&D facility in low Earth orbit for life sciences - made one small satellite at a time.* Our lab modules apply supervised biological work and permissioned evolution during spaceflight. First mission to launch October 2023.

RoosterBio, *Bioprocessing Application Scientist* (2021-2022) *Accelerate human mesenchymal stromal cell product and process development.* Collaborate with academics and industry to leverage a well-defined cellular therapy product line for scalable regenerative medicine cures.

Universities Space Research Association, contracted to NASA Ames Research Center *Scientist + Synthetic Biology Task Lead* (2017-2020) *Biological industrial design to outfit human missions to space.* Built biotechnology alongside evolutionary and synthetic biologists to reverse engineer life from extreme environments. Projects included: Digitizing a sea sponge to 3D-print a living filter; a portable device to make protein-based drugs; and field work in Antarctica.

Massachusetts Institute of Technology, Senseable City Lab, *Postdoctoral Fellow* (2015-2017) *A partially anonymized public health census using biology, data, and civic infrastructure.* As part of the Underworlds team, I automated wastewater sampling to measure the bacteria, virus, and chemicals in different neighborhoods. Our geolocated dataset became a heatmap of human health and consumption. Instances of the technology were deployed in Boston and Kuwait. The project has become the company BioBot Analytics.

Drexel University, Mechanical Engineering Department *Research Fellow / PhD Candidate* (2009-2014) *Developed manufacturing processes to build a model of human liver for space flight medicine.* Used scaffold-guided tissue engineering to reproduce the anatomical, multi-cell type structure of hepatic tissue. In collaboration with NASA Johnson Space Center, we used the 3D-printed model to measure drug toxicity in space-like environments.

Inventions

Heterogeneous filaments, methods of producing the same, scaffolds, methods of producing the same, droplets, ... WO/2017/019300 (2017)

<https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2017019300>

Compositions and Methods for Functionalized Patterning of Tissue Engineering Substrates Including Bioprinting Cell-Laden Constructs for Multicompartment Tissue Chambers. U.S. Patent 12 872,992 (2011) <https://www.freepatentsonline.com/y2011/0136162.html>

Service

Montefiore Health System, New York City

Collaborator (2016-present) *Joined a clinical trial of virtual reality as a non-pharmacological pain management strategy.* We collect physiological feedback using wearables to generate immersive experiences that hold promise for guiding pediatric patients towards calmer emotional states.

Cell culture skills: BSL2, human/animal cell lines, microscopy, antibody staining, plate reader assays, bioprinting, bioreactor (rotary, microfluidic, oscillatory compression/relaxation)

Programming skills: Digital reconstruction of medical images (ImageJ, ITK-SNAP), data analysis (Python, MatLab), computer-aided design and manufacturing CAD/CAM (AutoDesk products, SolidWorks, OpenSCAD, PTC Creo), computer numerical control CNC (G-code)

Prototyping skills: 3D printing, plasma treatment, laser cutting, electrospinning

Education

2009 BS/MS Mech Eng, Drexel University

2014 PhD Mech Eng, Drexel University

2015-17 Postdoc Urban Planning, MIT

Adjunct Faculty

2019 Santa Clara University

2021 University of Silicon Valley

Affiliations

Blue Marble Space Institute of Science, Affiliate

HISEAS Selene I Mission, Analog Astronaut

Quixote Expeditions Antarctica, Guest Scientist

World Health Summit, New Voices 2016

Funded Grants - Current Support

1. *Mycotecture Off Planet*. NASA Innovative Advanced Concepts (NIAC) Phase II 2021. Lynn J. Rothschild, Christopher Maurer, Debbie Senesky, Ivan Gláucio Paulino Lima, Jim Head, Jessica Snyder, Maikel Rheinstadter, Martyn Dade-Robertson. \$250k / 2 years
2. *An Astropharmacy*. NASA Innovative Advanced Concepts (NIAC) Phase I 2020. Lynn J. Rothschild (PI), Kate Adamala, David Loftus, Mike Jewett, Jessica Snyder, Ivan Gláucio Paulino Lima, Hans-Joachim Wieden. \$125k / 9 months - extended due to pandemic-related closures

Scopus Metrics Overview

<https://www.scopus.com/56007982800>

h-index

9

Citations

413

Authored Documents

25

Peer Reviewed Publications

1. Aversch NJ, Berliner AJ, Nangle SN, Zezulka S, Vengerova GL, Ho D, Casale CA, Lehner BA, Snyder JE, Clark KB, Dartnell LR. Microbial biomanufacturing for space-exploration—what to take and when to make. *Nature Communications*. 2023 Apr 21;14(1):2311. <https://www.nature.com/articles/s41467-023-37910-1>
2. Zajkowski T, Lee MD, Mondal SS, Carbajal A, Dec R, Brennock PD, Piast RW, Snyder JE, Bense NB, Dzwolak W, Jarosz DF. The hunt for ancient prions: archaeal prion-like domains form amyloid-based epigenetic elements. *Molecular Biology and Evolution*. 2021 May;38(5):2088-103. <https://doi.org/10.1093/molbev/msab010>
3. Lehner BA, Schlechten J, Filosa A, Pou AC, Mazzotta DG, Spina F, Teeney L, Snyder JE, Tjon SY, Meyer AS, Brouns SJ. End-to-end mission design for microbial ISRU activities as preparation for a moon village. *Acta Astronautica*. 2019 Sep 1;162:216-26. <https://doi.org/10.1016/j.actaastro.2019.06.001>
4. Snyder JE, Walsh D, Carr PA, Rothschild LJ. A makerspace for life support systems in space. *Trends in biotechnology*. 2019 Nov 1;37(11):1164-74. <https://doi.org/10.1016/j.tibtech.2019.05.003>
5. Liu Y, Hamid Q, Snyder JE, Wang C, Sun W. Evaluating fabrication feasibility and biomedical application potential of in situ 3D printing technology. *Rapid Prototyping Journal*. 2016 Oct 17. <https://doi.org/10.1108/RPJ-07-2015-0090>
6. Snyder JE, Hamid Q, Sun W. Fabrication of microfluidic manifold by precision extrusion deposition and replica molding for cell-laden device. *Journal of Manufacturing Science and Engineering*. 2016 Apr 1;138(4). <https://doi.org/10.1115/1.4031551>
7. Snyder JE, Son AR, Hamid Q, Wu H, Sun W. Hetero-cellular prototyping by synchronized multi-material bioprinting for rotary cell culture system. *Biofabrication*. 2015 Dec 29;8(1):015002. <https://doi.org/10.1088/1758-5090/8/1/015002>
8. Snyder JE, Son AR, Hamid Q, Wang C, Lui Y, Sun W. Mesenchymal stem cell printing and process regulated cell properties. *Biofabrication*. 2015 Dec 22;7(4):044106. <https://doi.org/10.1088/1758-5090/7/4/044106>
9. Wang C, Hamid Q, Snyder JE, Ayan H, Sun W. Localized surface functionalization of polycaprolactone with atmospheric-pressure microplasma jet. *Biomedical Physics & Engineering Express*. 2015 Jul 30;1(2):025002. <https://doi.org/10.1088/2057-1976/1/2/025002>
10. Hamid Q, Wang C, Snyder JE, Williams S, Liu Y, Sun W. Maskless fabrication of cell-laden microfluidic chips with localized surface functionalization for the co-culture of cancer cells. *Biofabrication*. 2015 Mar 2;7(1):015012. <https://doi.org/10.1088/1758-5090/7/1/015012>
11. Hamid Q, Wang C, Zhao Y, Snyder JE, Sun W. Fabrication of biological microfluidics using a digital microfabrication system. *Journal of Manufacturing Science and Engineering*. 2014 Dec 1;136(6). <https://doi.org/10.1115/1.4028419>
12. Snyder JE, Hunger PM, Wang C, Hamid Q, Wegst UG, Sun W. Combined multi-nozzle deposition and freeze casting process to superimpose two porous networks for hierarchical three-dimensional microenvironment. *Biofabrication*. 2014 Jan 15;6(1):015007. <https://doi.org/10.1115/ISFA2012-7105>
13. Snyder JE, Hamid Q, Wang C, Chang R, Emami K, Wu H, Sun W. Bioprinting cell-laden matrigel for radioprotection study of liver by pro-drug conversion in a dual-tissue microfluidic chip. *Biofabrication*. 2011 Sep 1;3(3):034112. <https://doi.org/10.1088/1758-5082/3/3/034112>