

# Nina R. Sinatra

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## Education

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- Harvard University** Cambridge, MA  
PhD, Materials Science and Engineering, GPA 3.7/4.0 2019 (expected)  
Master of Science, Engineering Sciences 2018
- Completed Harvard GSAS Business Club Mini-MBA (Summer 2016); coursework at Harvard Graduate School of Design (Fall 2013) and MIT Sloan (Fall 2015) on product design and digital fabrication
- Columbia University** New York, NY  
Master of Science, Materials Science and Engineering, GPA 3.8/4.0 2013
- Herbert French Fellowship: Outstanding Engineering Graduate Student
- Massachusetts Institute of Technology (MIT)** Cambridge, MA  
Bachelor of Science, Materials Science and Engineering, GPA 4.4/5.0 2012
- Sigma Xi Engineering Honor Society (inducted 2012)

## Selected Experience

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- Harvard Microrobotics Laboratory** | Harvard University. **Advisor:** Robert Wood Cambridge, MA  
*Doctoral Researcher* 03/17 - Present
- **Designing Soft Robots:**
    - Engineered ultra-soft pneumatic polymer actuators for delicate manipulation of irregular structures
    - Developed novel fabrication strategy for fiber-reinforced actuators and soft grippers
    - Derived analytical models for large deformation of soft pneumatic polymer actuators
    - Integrated nanotextiles into soft robots, and targeted complex bending modes using fiber orientation
  - **Deep Sea Field Testing:**
    - Implemented handheld soft gripping device for firsthand interaction with midwater marine species
    - Prepared devices and developed test protocols for delicate gripping in the deep-sea
    - Worked with collaborators at American Museum of Natural History and CUNY to define organismal benchmarks for soft gripper and to integrate gripper with existing remotely operated vehicle setup
- Disease Biophysics Group** | Harvard University Cambridge, MA  
*Doctoral Researcher* 01/14-02/17
- Established novel manufacturing processes for point-of-use and multi-material polymer nanofabrics
  - Co-authored 2 peer-reviewed publications, 2 patents, and 1 funded grant; 6 presentations and invited talks
  - Co-supervised and developed summer polymer/nanotechnology research projects for four U.S. Military Academy (West Point) cadets
  - Cadets' work was accepted to poster session at Biomedical Engineering Society Annual Meeting, Sept. 2015
- Biomaterials and Interface Tissue Engineering Laboratory, Columbia University** New York, NY  
*Masters Research* 09/12-06/13
- Developed novel hydroxyapatite-xerogel scaffolds for interfacial bone regeneration
- Max Planck Institute for Polymer Research (Max-Planck-Institut für Polymerforschung)** Mainz, Germany  
*Research Intern* 05/11-09/11
- Fabricated colloidal monolayers of photochromic nanospheres using emulsion polymerization
  - Analyzed reversible, light-induced data storage on three-dimensional colloid polymer structures
- United States Army Corps of Engineers, Engineer Research and Development Center** Concord, MA  
*Research Intern* 05/10-09/10
- Formulated decision analysis framework for nanotoxicology and life cycle analysis

## **Relevant Skills**

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**Computer:** Solidworks, Fusion 360, Python, Adobe Illustrator, Blender, Mathematica, MATLAB, LaTeX, COMSOL

**Selected Laboratory:** Instron mechanical testing, Nanofiber fabrication (rotary jet spinning, pull spinning), Emulsion polymerization, Soft lithography, Scanning Electron Microscopy, Spectroscopy (FTIR, Raman, XRD)

**Fabrication:** Digital prototyping and manufacturing of polymers and fabric using 3D printing, laser cutting, molding

**Languages:** English (native), Spanish (adv.), Farsi (conv.), German (conv.), Japanese (beg.)

## **Leadership Experience & Mentoring**

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**Harvard College Women in Science, Technology, Engineering, and Math (WISTEM)**

Cambridge, MA

*Mentor*

09/16-present

- Advise undergraduate students on research and opportunities in engineering

**Harvard Graduate Women in Science and Engineering (HGWISE)**

Cambridge, MA

*Member, Event Coordinator*

05/15-present

- Coordinate events and discussion panels relating to materials engineering and wearable technology

**TEDx Baghdad**

Baghdad, Iraq (worked remotely)

*Project Leader*

05/12-12/12

- Developed leadership and engineering initiatives for Iraqi students, children, and entrepreneurs
- Collaborated on project to build a fabrication laboratory (Fab Lab) in Baghdad
- Coordinated partnerships with MIT Fab Academy

## **Publications**

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**N.R. Sinatra**, T. Ranzani, J.J. Vlassak, K.K. Parker, and R.J. Wood. "Nanofiber-Reinforced Soft Fluidic Micro-Actuators." *Journal of Micromechanics and Microengineering*, 2018.

**N.R. Sinatra**, J.U. Lind, and K.K. Parker. "Fabricating Multi-Material Nanofabrics using Rotary Jet Spinning." *2017 IEEE International Conference on Nanotechnology (IEEE-NANO)*, 2016 (pp. 715-719).

L.F. Deravi, **N.R. Sinatra (co-first author)**, C.O. Chantre, A.P. Nesmith, H. Yuan, S.K. Deravi, J.A. Goss, L.A. MacQueen, M.R. Badrossamy, G.M. Gonzalez, M.D. Phillips, K.K. Parker. "Design and Fabrication of Fibrous Nanomaterials using Pull Spinning." *Macromolecular Materials and Engineering*, 2017.

Cover article

K. Bley, **N. Sinatra**, N. Vogel, K. Landfester, C.K. Weiss. "Switching light with light – Advanced functional colloidal monolayers." *Nanoscale*, 2013.

J.M. Keisler, Z.A. Collier, E.J. Chu, **N. Sinatra**, and I. Linkov. "Value of Information Analysis: State-of-the-Application." *Environment, Systems and Decisions*, 2013.

## **Conference Presentations & Invited Talks**

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"Handle With Care: Soft Robots for Delicate Midwater Investigations of Soft-Bodied Gelatinous Zooplankton." National Academies Keck Futures Initiative: Discovering the Deep Blue Sea Mid-Cycle Grant Meeting, Huntington Beach, CA, June 2018.

"Fabricating Multi-Material Nanofabrics using Rotary Jet Spinning." 2017 IEEE International Conference on Nanotechnology (IEEE-NANO), Pittsburgh, July 2017. (*Accepted*)

"Women in Wearable Tech" panel, Harvard College Women's Center discussion series "Women in Innovation", March 8, 2017. (Moderator)

"Engineering Novel Nanofabrics." Tangible Media Group, MIT Media Lab, Host: Hiroshi Ishii, March 2017.

"Manufacturing Smarter Fabrics." MIT Alumni Association Faculty Forum Webcast, MIT, Jan. 2017.

"NANO.STASIS: Merging Art and Science." Art Technology Psyche II Symposium, Harvard University, Apr. 2016

"Modular Fabrication of Non-Cylindrical Nanofiber Geometries." Materials Research Society Fall Meeting, Poster Session, Nov. 2015

"Applied Mathematics in Biomaterials Engineering." United States Military Academy at West Point, Sept. 2015

"Pull Spinning: A Novel Nanofiber Fabrication Technique." Biomedical Engineering Society Annual Meeting, Poster Session, Sept. 2015

## **Grants**

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**Physical Sciences and Engineering Accelerator Award** (co-author) 01/2015  
Harvard University Office of Technology Development

## **Patents**

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**N.R. Sinatra**, T. Ranzani, J.J. Vlassak, K.K. Parker, and R.J. Wood. Nanofiber-Reinforced Soft Fluidic Micro-Actuators. Provisional Patent, filed May 2018.

A.R. Gannon, A.L. Gliberman, K.K. Parker, B.D. Pope, K.L. Shores, and **N.R. Sinatra**. Cartridge-Based System for Long Term Culture of Cell Clusters. U.S. Patent Application 62/411,124, published May 2017.

K.K. Parker, B.D. Pope, and **N.R. Sinatra**. Three-Dimensional Scaffolds for Cell Culture and Methods of Use Thereof. Provisional Patent Serial No. 62/332,092, filed Oct. 2016.

## **Selected Honors & Achievements**

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Mini-MBA Program, Harvard Graduate Business Club, 2016 (intensive five-week business course)

John A. and Elizabeth S. Armstrong Innovation Fund Fellowship, 2015

Herbert French Fellowship: Outstanding Engineering Graduate Student, 2013

Sigma Xi Engineering Honor Society: Nominated, inducted 2012

National Science Foundation Fellowship: Honorable Mention, 2012

Anthony Sun Fellowship Award, 2011

## **Teaching**

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### **Harvard University**

Teaching Fellow: "Introduction to Biomaterials" Spring 2015

- Coordinated laboratory sections for class of 37 students
- Held weekly office hours and graded assignments

### **Columbia University**

Teaching Assistant: "Elements of Materials" Fall 2012

- Held weekly office hours and graded assignments for 40 students

Teaching Assistant: "Processing of Metals and Semiconductors" Spring 2013

- Held weekly office hours and graded assignments for 20 students

## Media

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Sookne, Keren. "Taking Cues from Spiders." *Healthcare Packaging*. May/June 2017. Print and web. [https://www.healthcarepackaging.com/sites/default/files/digital\\_edition/MayJune2017HCP/HCP\\_May\\_2017/index.html](https://www.healthcarepackaging.com/sites/default/files/digital_edition/MayJune2017HCP/HCP_May_2017/index.html)  
Cover article

Huesmann, David. "Point and Shoot: Nanofiber Manufacturing using Pull Spinning." *Advanced Science News*. 22 March 2017. Web. <http://www.advancedsciencenews.com/point-shoot-nanofiber-manufacturing-using-pull-spinning/>

Burrows, Leah. "Portable nanofiber device offers precise, point-and-shoot capability for fabricating 3D tissue and smart fabrics." *Harvard Wyss Institute*. 1 March 2017. Web. <https://wyss.harvard.edu/portable-nanofiber-device-offers-precise-point-and-shoot-capability-for-fabricating-3d-tissue-and-smart-fabrics/>

ArtfixDaily. "Harvard Visiting Artist Carla Ciuffo Merges Art With Cutting-Edge Science." *ArtfixDaily*, 14 November 2015. Web. <http://www.artfixdaily.com/artwire/release/9911-harvard-visiting-artist-carla-ciuffo-merges-art-with-cutting-edge>

Skinner, Emily. "Encryption at the flick of a light switch." *RSC Chemistry World*, 18 November 2013. Web. <http://www.rsc.org/chemistryworld/2013/11/encryption-colloidal-pixels-data-storage>