

# Xiaoyue Ni

Mechanical Engineering and Materials Science  
Biostatistics and Bioinformatics  
Duke University

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## RESEARCH INTERESTS

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Flexible electronics, bio-integrated electronics, wearable technology, robotic materials and smart structures, metamaterials, precision measurement, non-destructive testing, deformation physics of random media, machine learning

## EDUCATION

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- **California Institute of Technology** Pasadena, CA  
*Ph.D. in Materials Science - Prof. Julia R. Greer* Aug 2012 - Oct 2017
- **California Institute of Technology** Pasadena, CA  
*M.S. in Materials Science* Sep 2012 - Jul 2014
- **Marietta College** Marietta, OH  
*B.S. in Physics and Mathematics, Minor in Economics* Aug 2008 - May 2012

## PROFESSIONAL EXPERIENCE

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- Nov 2020 - Current **Duke University**, Assistant Professor  
Nov 2017 - Oct 2020 **Northwestern University**, Postdoctoral Research Associate

## SELECTED PUBLICATIONS

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### Complete List of Published Work

Google Scholar: <https://scholar.google.com/citations?user=iOD3RA4AAAAJhl=en>

### Selected Publications

Equal Contribution†, Corresponding Author\*

1. **Yun Bai**†, Heling Wang†\*, Yeguang Xue, **Yuxin Pan**, Jin-Tae Kim, Xinchun Ni, Tsu-Li Liu, Yiyuan Yang, Mengdi Han, Yonggang Huang\*, John A. Rogers\*, and **Xiaoyue Ni**\*, “A dynamically reprogrammable surface with self-evolving shape morphing,” *Nature* 609, 701–708 (2022) [DOI]
2. Xinchun Ni†, Haiwen Luan†, Jin-Tae Kim†, Sam I. Rogge, **Yun Bai**, Jean Won Kwak, Shangliangzi Liu, Da Som Yang, Shuo Li, Shupeng Li, Zhengwei Li, Yamin Zhang, Changsheng Wu, **Xiaoyue Ni**\*, Yonggang Huang\*, Heling Wang\*, and John A. Rogers\*, “Soft shape-programmable surfaces by fast electromagnetic actuation of liquid metal networks,” *Nature Communications* 13, 5576 (2022) [DOI]
3. **Xiaoyue Ni**†, Wei Ouyang†, Hyoyoung Jeong†, Jin-Tae Kim, Andreas Tzavelis, Ali Mirzazadeh, Changsheng Wu, Jong Yoon Lee, Matthew Keller, Chaithanya K. Mummidisetty, Manish Patel, Nicholas Shawen, Joy Huang, Hope Chen, Sowmya Ravi, Jan-Kai Chang, Kun Hyuck Lee, Yixin Wu, Ferrona Lie, Youn J. Kang, Jong Uk Kim, Leonardo P. Chamorro, Anthony R. Banks, Ankit Bharat, Arun Jayaraman, Shuai Xu\*, and John A. Rogers\*, “Automated, multiparametric monitoring of respiratory biomarkers and vital signs in clinical and home settings for COVID-19 patients,” *Proceedings of the National Academy of Sciences* 118 (19), e2026610118 (2021) [DOI]
4. Xiaogang Guo†, **Xiaoyue Ni**†, Jiahong Li†, Hang Zhang, Fan Zhang, Huabin Yu, Jun Wu, Yun Bai, Hongshuai Lei, Yonggang Huang, John A. Rogers\*, and Yihui Zhang\*, “Designing mechanical metamaterials with kirigami-inspired, hierarchical constructions for giant positive and negative thermal expansion,” *Advanced Materials* 2004919 (2021) [DOI]
5. KunHyuck Lee†, **Xiaoyue Ni**†, Jong Yoon Lee†, Hany Arafa, David Pe, Shuai Xu, Raudel Avila, Masahiro Irie, Joo Hee Lee, Ryder L Easterlin, Dong Hyun Kim, Ha Uk Chung, Omolara O Olabisi, Selam Getaneh, Esther Chung, Mark Hill, Jeremy Bell, HoKyung Jang, Claire Liu, Jun Bin Park, Jungwoo Kim, Sung Bong Kim, Sunita Mehta, Matt Pharr, Andreas Tzavelis, Jonathan T. Reeder, Ivy Huang, Yujun Deng, Zhaoqian Xie\*, Charles R. Davies\*, Yonggang Huang\*, and John A. Rogers\*, “Mechano-acoustic sensing of physiological processes and body motions using soft, wireless devices interfaced to the skin at the suprasternal notch,” *Nature Biomedical Engineering* 4 (2), 148-158 (2020) [DOI]
6. **Xiaoyue Ni**†, Xiaogang Guo†, Jiahong Li, Yonggang Huang, Yihui Zhang\*, and John A. Rogers\*, “Two-dimensional mechanical metamaterials with widely-tunable unusual modes of thermal expansion,” *Advanced Materials* 31 (48), 1905405 (2019) [DOI]

7. **Xiaoyue Ni**<sup>\*</sup>, Haolu Zhang, Danilo B. Liarte, Louis W. McFaul, Karin A. Dahmen, James P. Sethna, and Julia R. Greer, “Yield precursor dislocation avalanches in small crystals: the irreversibility transition,” *Physical Review Letters* 123 (3), 035501 (2019) [DOI]
8. **Xiaoyue Ni**<sup>\*</sup>, Stefanos Papanikolaou, Gabriele Vajente, Rana X Adhikari, and Julia R. Greer, “Probing microplasticity in small scale FCC crystals via Dynamic Mechanical Analysis,” *Physical Review Letters* 118 (15), 155501 (2017) [DOI]
9. **Xiaoyue Ni**, Julia R. Greer, Kaushik Bhattacharya, Richard D. James, and Xian Chen<sup>\*</sup>, “Exceptional resilience of small-scale Au<sub>30</sub>Cu<sub>25</sub>Zn<sub>45</sub> under cyclic stress-induced phase transformation,” *Nano Letters* 16 (12), 7621 (2016) [DOI]

### Other Publications

1. Jin-Tae Kim<sup>†</sup>, Wei Ouyang<sup>†</sup>, Hanul Hwang<sup>†</sup>, Hyoyoung Jeong<sup>†</sup>, Soohyeon Kang, Sanjeeb Bose, Sung Soo Kwak, **Xiaoyue Ni**, Hyeonsu Kim, Jaehong Park, Hope Chen, Alan Soetikno, Joohee Kim, Shuai Xu, Leonardo P Chamorro<sup>\*</sup>, John A Rogers, “Dynamics of plosive consonants via imaging, computations, and soft electronics,” *Proceedings of the National Academy of Sciences* 119 (46), e2214164119 (2022) [DOI]
2. Wenbo Ding, Amir H Alavi, Francesco Fioranelli, Gang Li, **Xiaoyue Ni**, Linqi Song, “Sensing, processing, computing and networking for the era of wearables,” *Digital Signal Processing* 125 (C) (2022) [DOI]
3. Changsheng Wu<sup>†</sup>, Alina Y Rwei<sup>†</sup>, Jong Yoon Lee, Wei Ouyang, Lauren Jacobson, Haixu Shen, Haiwen Luan, Yameng Xu, Jun Bin Park, Sung Soo Kwak, **Xiaoyue Ni**, Wubin Bai, Daniel Franklin, Shuo Li, Yiming Liu, Xinchun Ni, Amanda M Westman, Matthew R MacEwan, John A Rogers<sup>\*</sup>, Mitchell A Pet<sup>\*</sup>, “A wireless near-infrared spectroscopy device for flap monitoring: proof of concept in a porcine musculocutaneous flap model,” *Journal of reconstructive microsurgery* 38 (02), 096-105 (2022) [DOI]
4. Zihan Wang, Jiarong Li, Yuchao Jin, Jiyu Wang, Fang Yang, Gang Li, **Xiaoyue Ni**, Wenbo Ding<sup>\*</sup> “Sensing beyond itself: Multi-functional use of ubiquitous signals towards wearable applications,” *Digital Signal Processing* 116, 103091 (2021) [DOI]
5. Hyoyoung Jeong<sup>†</sup>, Jong Yoon Lee<sup>†</sup>, KunHyuck Lee<sup>†</sup>, Youn J Kang<sup>†</sup>, Jin-Tae Kim<sup>†</sup>, Raudel Avila, Andreas Tzavelis, Joohee Kim, Hanjun Ryu, Sung Soo Kwak, Jong Uk Kim, Aaron Banks, Hokyung Jang, Jan-Kai Chang, Shupeng Li, Chaithanya K Mummidisetty, Yoonseok Park, Simone Nappi, Keum San Chun, Young Joong Lee, Kyeongha Kwon, **Xiaoyue Ni**, Ha Uk Chung, Haiwen Luan, Jae-Hwan Kim, Changsheng Wu, Shuai Xu, Anthony Banks, Arun Jayaraman, Yonggang Huang, John A Rogers<sup>\*</sup>, “Automated, multiparametric monitoring of respiratory biomarkers and vital signs in clinical and home settings for COVID-19 patients,” *Science advances* 7 (20), eabg3092 (2021) [DOI]
6. Keum San Chun<sup>†</sup>, Youn J Kang<sup>†</sup>, Jong Yoon Lee<sup>†</sup>, Morgan Nguyen, Brad Lee, Rachel Lee, Han Heul Jo, Emily Allen, Hope Chen, Jungwoo Kim, Lian Yu, **Xiaoyue Ni**, KunHyuck Lee, Hyoyoung Jeong, JooHee Lee, Yoonseok Park, Ha Uk Chung, Alvin W Li, Peter A Lio, Albert F Yang, Anna B Fishbein, Amy S Paller, John A Rogers<sup>\*</sup>, Shuai Xu<sup>\*</sup>, “A skin-conformable wireless sensor to objectively quantify symptoms of pruritus,” *Science advances* 7 (18), eabf9405 (2021) [DOI]
7. Jiarong Li, Changsheng Wu, Ishara Dharmasena, **Xiaoyue Ni**, Zihan Wang, Haixu Shen, Shao-Lun Huang, Wenbo Ding<sup>\*</sup>. “Trieboelectric nanogenerators enabled internet of things: A survey.” *Intelligent and Converged Networks* 1 (2), 115-141 (2020) [DOI]
8. Leonid Prokhorov<sup>\*</sup>, Valeriy Mitrofanov, Brittany Kamai, Aaron Markowitz, **Xiaoyue Ni**, and Rana X Adhikari, “Measurement of mechanical losses in the carbon nanotube black coating of silicon wafers.” In press, *Classical and Quantum Gravity* 37 (1), 015004 (2019) [DOI]
9. Wubin Bai, Ruxing Fu, Jiho Shin, Irawati Kandela, Di Lu, **Xiaoyue Ni**, Yoonseok Park, Zhonghe Liu, Tao Hang, Di Wu, Yonghao Liu, Chad R. Haney, Iwona Stepien, Quansan Yang, Jie Zhao, Hao Zhang, Xing Sheng, Lan Yin, Keith MacRenaris, Anil Brikha, Fraser Aird, Maryam Pezhouh, Weidong Zhou, and John A. Rogers<sup>\*</sup>, “Bioresorbable Systems for In Vivo, Spectroscopic Measurements of Physiological Status and Neural Activity.” *Nature Biomedical Engineering* 3 (8), 644 (2019) [DOI]
10. James P. Sethna<sup>\*</sup>, Matthew K. Bierbaum, Karin A. Dahmen, Carl P. Goodrich, Julia R. Greer, Lorien X. Hayden, Jaron P. Kent-Dobias, Edward D. Lee, Danilo B. Liarte, **Xiaoyue Ni**, Katherine N. Quinn, Archishman Raju, D. Zeb Rocklin, Ashivni Shekhawat, and Stefano Zapperi, “Deformation of crystals: Connections with statistical physics.” *Annual Review of Materials Research* 47 (1) (2017) [DOI]
11. Gabriele Vajente<sup>\*</sup>, Eric Quintero, **Xiaoyue Ni**, Koji Arai, Eric Gustafson, Norna Robertson, Eduardo J. Sanchez, Julia R. Greer, and Rana X Adhikari, “An instrument to measure mechanical up-conversion phenomena in metals in the elastic regime,” *Review of Scientific Instruments*. 87, 065107 (2016) [DOI]

### Patents

1. John A Rogers, Shuai Xu, Kun Hyuck Lee, **Xiaoyue Ni**, Angela Roberts, Bonnie Martin-harris, Leora Cherney, Arun Jayaraman, Edna Babbitt, Megan O’Brien, “Wireless medical sensors and methods,” US Patent App. 16/970,023, 2021

## HONORS AND AWARDS

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- *LIGO Scientific Collaboration Poster Prize*, LSC-Virgo Meeting, Pasadena, CA, 2015
- *Phi Beta Kappa (Academic Honor Society)*, 2012
- *Sigma Pi Sigma (American Honor Society in physics)*, 2012
- *Omicron Delta Epsilon (International Economics Honor Society)*, 2011

## SYNERGISTIC ACTIVITIES

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- Editorial service for scientific journals  
Guest editor, *Digital Signal Processing*
- Organizing conferences as committee member or session chair  
2023 – Organizer, *MRS Spring Meeting Symposium*, “Development and Design of Responsive Architected Materials”
- Academic and society service  
2021–Present – Member, aiM (AI for Understanding and Designing Materials) Program, Duke University  
2021–Present – Member, Mechanical Engineering and Materials Science PhD mentoring network, Duke University  
2021–Present – Member, Duke Materials Initiative, Duke University  
2021–Present – Member, Research Triangle Soft Matter Group
- Grant and peer review journals  
Journal reviewer for *Science*, *Nature Communications*, *Science Advances*, *Nano Letters*, *Extreme Mechanics Letters*, *Biomacromolecules*, *Digital Signal Processing*, *Sensors*, *IEEE Internet of Things Journal*, *Micromachines*, *Frontiers Digital Health*, *International Journal of Environmental Research and Public Health*  
Grant reviewer for *National Science Foundation (NSF)*, *Army Research Office (ARO)*, *Research Grants Council (RGC) of Hong Kong*.
- Mentoring and guest lecturing  
2023 - Guest lecturer for Summer STEM Academy, Duke University  
2022 – Member, 360 Coaching Fellows Program, Duke University  
2021, 2022 – Guest lecturer for Biomedical Microsystems, Duke University  
2021 – MEMS GSC Faculty Presentation Seminar, Duke University  
2021 – aiM Program Seminar, Duke University  
2021 – Guest speaker for Q&A session with Duke BMES (undergrad society), Duke University  
2021 – REU (Research Experiences for Undergraduates) Seminar, Duke University  
2015, 2016 – Mentor of Summer Undergraduate Research Fellowships (SURF program), Caltech

## INVITED TALKS

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- “A dynamically reprogrammable surface with self-evolving shape morphing,” *International Conference on Flexible Electronics (ICFE 2022)*, Virtual Seminar, Dec 2022
- “A dynamically reprogrammable surface with self-evolving shape morphing,” *IEEE NTC Forum on Nanotechnology Focus – Nanotechnology for Soft Electronics*, NC State University, Raleigh, NC, Dec 2022
- “A dynamically reprogrammable metasurface with self-evolving shape morphing,” *LabLinks*, NC State University, Raleigh, NC, Oct 2022
- “Human-centered materials intelligence via epidermal electronics and programmable matter,” *Materials Science and Engineering Seminar*, NC State University, Raleigh, NC, Sep 2022
- “Human-centered materials intelligence via epidermal electronics and active metamaterials,” *Engineering and Applied Science Forum (EASF) Webinar*, Virtual Seminar, Sep 2022
- “Human-centered materials intelligence via epidermal electronics and programmable matter,” *Lawrence Livermore National Laboratory Webinar*, Virtual Seminar, Jan 2021
- “Epidermal mechano-acoustic sensing for precision and pervasive healthcare,” *SPIE-MRSEC Student Seminar Series*, Northwestern University, Evanston, IL, Sep 2020
- “Human-centered materials intelligence via epidermal electronics and programmable matter,” *Faculty Candidate Talk*, Brown (Mar), UW (Mar), UIUC (Feb), Notre Dame (Feb), Gatech (Feb), Duke (Feb), UBC (Jan), 2020
- “Investigating microstructural mechanics of materials through microplastic Deformation,” *Faculty Candidate Talk*, Department of Materials Science and Engineering, Texas A&M University, College Station, TX, Jan 2019
- “Critical phenomena in crystal deformation and mechanical behavior of small-scale metallic systems,” Rogers Research Group, University of Illinois at Urbana-Champaign, Urbana, Illinois, Feb 2017
- “Probing microplasticity: the mechanical noise in metal’s pre-yield regime” Physics Colloquium, Marietta College, Marietta, OH, Feb 2017

## CONFERENCE PRESENTATIONS

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- “A dynamically reprogrammable metasurface with self-evolving shape morphing,” MRS Spring Meeting, Honolulu, HI, 2022
- “A dynamically reprogrammable metasurface with self-evolving shape morphing,” APS March Meeting, Chicago, IL, 2022
- “Yield precursor dislocation avalanches in small crystals: the irreversibility transition,” APS March Meeting, Los Angeles, CA, 2018
- “Crackling underneath machine noise: Dynamic Modulus Analysis as a way to probe abrupt microplasticity in FCC crystals,” International Conference on Plasticity, Damage, and Fracture, Puerto Vallarta, Mexico, Jan 2017 (**Invited**)
- “Status of the crackle experiment,” LIGO Scientific Collaboration (LSC) - Virgo meeting, Pasadena, CA, 2017
- “Update on micromechanical investigations,” LIGO Scientific Collaboration (LSC) -Virgo meeting, Pasadena, CA, 2016
- “Elastic interactions of dislocations as gleaned from nano-mechanical experiments,” 52nd Annual Society of Engineering Science (SES) Technical Meeting, Texas A&M University, Austin, TX, 2015
- “Probing micro-mechanics of flow in metals through crackling noise and mean-field theory,” 7th International Conference on Multiscale Materials Modeling (MMM), Berkeley, CA, 2014

## MENTORING & ADVISING

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### Ph.D. Students

Jan 2021 - Current	Yun Bai, Mechanical Engineering and Materials Science, Duke University
Jan 2021 - Current	Chenhang Li, Mechanical Engineering and Materials Science, Duke University
Sep 2021 - Current	Kyle Pan, Mechanical Engineering and Materials Science, Duke University
Sep 2022 - Current	Kaiping Yin, Mechanical Engineering and Materials Science, Duke University

### M.S. Students

Sep 2022 - Current	Jonathan Lau, Biomedical Engineering, Duke University
Sep 2020 - May 2022	Ravi Prakash, Mechanical Engineering and Materials Science, Duke University
Sep 2019 - May 2020	Shulin Chen, Biomedical Engineering, Northwestern University
Oct 2018 - May 2020	Jiahong Li, Materials Science and Engineering, Northwestern University

### Undergraduate Students

Sep 2022 - Current	Swetha Sekhar, Mechanical Engineering and Materials Science, Duke University
Sep 2022 - Dec 2022	Allison Taub, Mechanical Engineering and Materials Science, Duke University
Jun 2022 - Current	Mohammad Ismail, Mechanical Engineering and Materials Science, Duke University
Jun 2022 - Current	Alejandro Assael, Mechanical Engineering and Materials Science, Duke University
May 2022 - Current	David Prada, Mechanical Engineering and Materials Science, Duke University
Sep 2021 - Dec 2021	Alex Xu, Electrical and Computer Engineering, Computer Science, Duke University
Aug 2021 - Dec 2021	Alicia Wu, Electrical and Computer Engineering, Computer Science, Duke University
Sep 2020 - May 2021	Moses Makangila, Mechanical Engineering and Materials Science, Duke University
Feb 2019 - Dec 2019	Ryder L. Easterlin, Molecular Biosciences, Northwestern University
Feb 2019 - Dec 2019	Lyon Zhang, Computer Science, Northwestern University
Feb 2018 - Jun 2019	Selam Getaneh, Mechanical Engineering, Northwestern University
Feb 2018 - Jun 2019	David Pe, Biology and Economy, Northwestern University
Jun 2018 - Jun 2019	Mark Hill, Biomedical Engineering, Northwestern University
Jun 2018 - Feb 2019	Esther Chung, Biomedical Engineering, Northwestern University
Jun 2018 - Feb 2019	Omolara O. Olabisi, Biomedical Engineering, Northwestern University
Jun 2016 - Aug 2016	Dylan Lu, Mechanical Engineering, California Institute of Technology
Jun 2016 - Aug 2016	Riccardo Maggiore, SURF program, California Institute of Technology
Jun 2015 - Aug 2015	Kla Karava, SURF program, California Institute of Technology
Jun 2015 - Aug 2015	Saikanth Dacha, SURF program, California Institute of Technology

## TEACHING

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### Instructor

Spring 2022 - Present	Structure and Properties of Solids, Duke University
Spring 2021 - Present	Energy Flow and Wave Propagation in Elastic Solids, Duke University

### Teaching Assistant

Spring 2019	Bioelectronics, Northwestern University
Spring 2016	Kinetics of Solid Phase Transformations, California Institute of Technology
Winter 2014	Practical, Freshman Physics Course, California Institute of Technology
Fall 2013	Introductory Physics Laboratory, California Institute of Technology