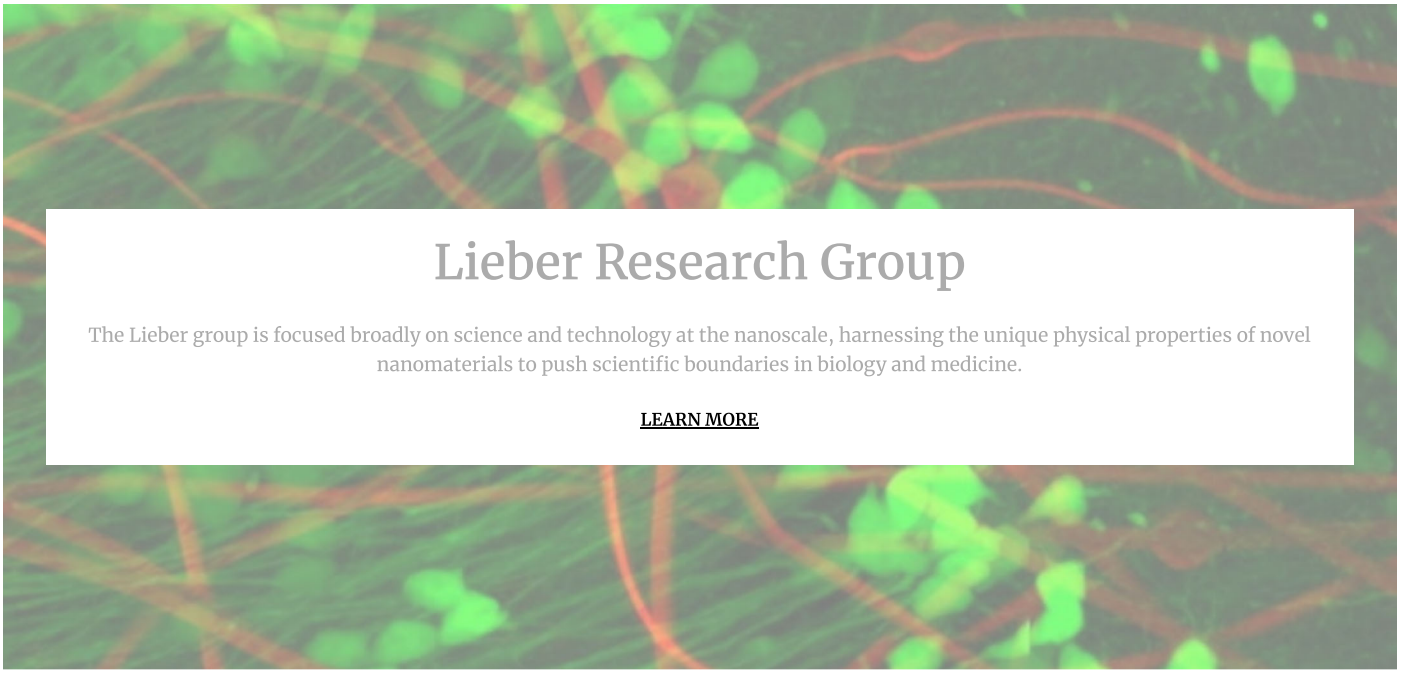
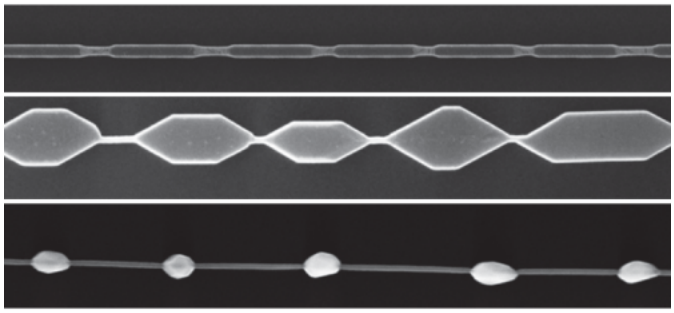
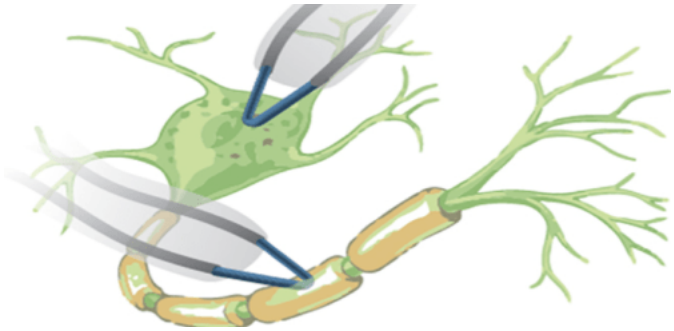




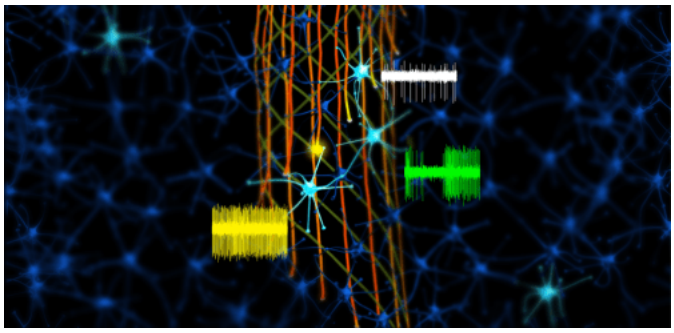
Nanomaterials

We are pushing the boundaries in design, synthesis, characterization and hierarchical assembly of nanoscale materials, with an emphasis on novel nanostructures and device arrays for use at the interface with biology and medicine. See Research page.



Nano-Bioelectonics

We are pioneering the interface between nanoelectronics and the life sciences, from sensors for real-time disease detection to development of novel cyborg cells and hybrid nanoelectronics-innervated tissues. See Research page.



Brain Science

We are focusing on a novel approach for integrating electronics within the brain and other areas of the nervous system, which involves non-invasive syringe delivery of neural network-like mesh electronics into targeted distinct brain regions. See Research page.

News & Highlights

Charles Lieber elected to the National Academy of Engineering

Professor Lieber was among the 87 new members elected in 2020 to the National Academy of Engineering. According to its website, "Academy membership honors those who have made outstanding contributions to engineering research, practice, or education..." He is the 30th scientist in history to be elected a member to all three National Academies of Sciences, Engineering, and Medicine. READ MORE

Charles M. Lieber awarded the 2019 Welch Award in Chemistry

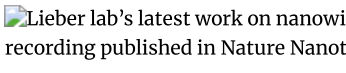
The Welch Foundation announced the 2019 winners of the prestigious Robert A. Welch Award in Chemistry, which honors highly-respected and influential leaders in the fields of nanoscience and nanotechnology. Charles M. Lieber shares his award with A. Paul Alivisatos, who are recognized for their important research contributions which have had a significant, positive impact on humankind. Lieber has provided seminal concepts central to the bottom-up paradigm of nanoscience and has been a leader in the application of nanomaterials. READ MORE

Lieber and Patel introduce paradigm of precision electronic medicine as published in Nature Biotechnology

The concept of "precision electronic medicine in the brain" is articulated for the first time as the vision for how neurotechnology can deliver personalized medicine to treat complex neurological and psychiatric disorders, as well as restore functions in degenerative diseases, trauma, and amputation. Neuron-like electronics could provide a way to stably map, track, and modulate the same individual neurons and neural circuits over extended time periods, unlocking new avenues for personalized therapy. This work addresses how to build an intimate and long-term stable interface between electronics and the constituent cells of the brain via tissue-like, high-resolution and large-scale neural probes. Previous advances have been featured in various news media; please see articles here.

READ MORE

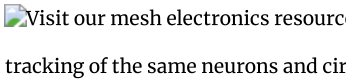
Lieber lab's latest work on nanowire arrays for scalable intracellular recording published in Nature Nanotechnology


Lieber lab's latest work on nanowire arrays for scalable intracellular recording published in Nature Nanotechnology

The article, titled "Scalable ultrasmall three-dimensional nanowire transistor probes for intracellular recording," describes the Lieber group's latest revolutionary approach to scalable intracellular recording by large arrays of nanowire transistors. This work represents a major step towards tackling the general problem of integrating 'synthesized' nanoscale building blocks into chip and wafer scale arrays, thereby addressing the long-standing challenge of scalable intracellular electrical recording and ultimately driving the development of advanced high-resolution brain-machine interfaces. Please see the various news media articles here.

READ MORE

Visit our mesh electronics resources website!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Syringe-injectable mesh electronics can integrate seamlessly with brain, retina and other tissues in living animals to yield an endogenous distribution of cells and to enable stable tracking of the same neurons and circuits over months to year periods, opening up exciting opportunities in neuroscience, bioengineering and medicine. Protocols, photomask designs for mesh fabrication, and printed circuit boards for input/output (I/O) interfaces as well as other information relating to injectable mesh electronics are now posted on our shared resources site. We hope these resources will be of value to researchers seeking to implement this unique technology in their work.

READ MORE

Recent Publications

A. Zhang, Y. Zhao, S. You and C.M. Lieber, "Nanowire probes could drive high-resolution brain-machine interfaces,"NANO TODAY DOI: 10.1016/J.NANTOD.2019.100821, 9 DEC 2019.

M. Sistani, J. Delaforce, R. B. G. Kramer, N. Roch, M. A. Luong, M.I. den Hertog, E. Robin, J. Smoliner, J. Yao, C.M. Lieber, C. Naud, A. Lugstein and O. Buisson, "Highly transparent contacts to the 1D hole gas in ultrascaled Ge/Si core/shell nanowires,"ACS NANO 13, 14145–14151 (2019).

N.M. Tran, K. Shekhar, I.E. Whitney, A. Jacobi, I. Benhar, G. Hong, W. Yan, X. Adiconis, M.E. Arnold, J.M. Lee, J.Z. Levin, D. Lin, C. Wang, C.M. Lieber, A. Regev, Z. He and J.R. Sanes, "Single-cell profiles of retinal ganglion cells differing in resilience to injury reveal neuroprotective genes,"NEURON 86, 21-24 (2019).

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J.M. Lee, G. Hong, D. Lin, T.G. Schuhmann, A.T. Sullivan, R.D. Viveros, H.-G. Park and C.M. Lieber, "Nano-enabled direct contact interfacing of syringe-injectable mesh electronics,"NANO LETT. 19, 5818–5826 (2019).

Y. Zhao, S. You, A. Zhang, J.-H. Lee, J.L. Huang and C.M. Lieber, "Scalable ultrasmall three-dimensional nanowire transistor probes for intracellular recording,"NAT. NANOTECHNOL. 14, 783-790 (2019).

R.D. Viveros, T. Zhou, G. Hong, T.-M. Fu, H.Y.G. Lin and C.M. Lieber, "Advanced one- and two-dimensional mesh designs for injectable electronics,"NANO LETT. 19, 4180-4187 (2019).

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X. Yang, T. Zhou, T.J. Zwang, G. Hong, Y. Zhao, R.D. Viveros, T.-M. Fu, T. Gao and C.M. Lieber, "Bioinspired neuron-like electronics,"NAT. MATER. 18, 510-517 (2019).

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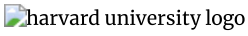

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