ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Have Questions?

Type them into questions box!

"Why am I muted?"
Don't worry. Everyone is muted except the presenter and host. Thank you and enjoy the show.

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

@AmerChemSociety

@AmericanChemicalSociety

@AmerChemSociety

LinkedIn https://www.linkedin.com/company/american-chemical-society

Check out the ACS Webinar Library!

An ACS member exclusive benefit

ACS Chemistry for Life®

Hundreds of presentations from the best and brightest minds that chemistry has to offer are available to you on-demand. The Library is divided into 6 different sections to help you more easily find what you are searching.

Professional Development

▶ View the Collection

Learn how to write better abstracts, deliver more engaging presentations, and network to your next dream job. Brush up on your soft skills and set a new career path by mastering what can not be taught in the lab.

Technology & Innovation

▶ View the Collection

From renewable fuels to creating the materials for the technology of tomorrow, chemistry plays a pivotal role in advancing our world. Meet the chemists that are building a better world and see how their science is making it happen.

Drug Design and Delivery

▶ View the Collection

The Drug Design Delivery Series has built a collection of the top minds in the field to explain the mechanics of drug discovery. Discover the latest research, receive an overview on different fields of study, and gain insight on how to possibily overcome your own med chem roadblocks.

Culinary Chemistry

▶ View the Collection

Why does food taste better when it is grilled or what molecular compounds make a great wine? Discover the delectable science of your favorite food and drink and don't forget to come back for a second helping.

Popular Chemistry

▶ View the Collection

Feeling burdened by all that molecular weight? Listen to experts expound on the amazing side of current hot science topics. Discover the chemistry of rockets, how viruses have affected human history, or the molecular breakdown of a hangover.

Business & Entrepreneurship

▶ View the Collection

How do ideas make it from the lab to the real world? Discover the ins and outs of the chemical industry whether you are looking to start a business or desire a priceless industry-wide perspective.

https://www.acs.org/content/acs/en/acs-webinars/videos.html

3

Learn from the best and brightest minds in chemistry! Hundreds of webinars on diverse topics presented by experts in the chemical sciences and enterprise.

Edited Recordings are an exclusive ACS member benefit and are made available once the recording has been edited and posted.

Live Broadcasts of ACS Webinars® continue to be available to the general public several times a week generally from 2-3pm ET!

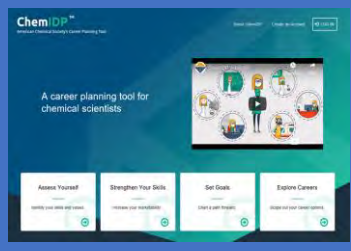
A **collection of the best recordings** from the ACS Webinars Library will occasionally be rebroadcast to highlight the value of the content.

www.acs.org/acswebinars

4

Advance
YOUR CAREER

ChemIDP™



ChemIDP.org

Discover
ACS PUBLICATIONS

Publishing Resources

ACS REVIEWER LAB™

ACS axial

ACS AUTHOR UNIVERSITY

ACS Authoring Services

publish.acs.org

Connect
WITH CHEMISTS AND OTHER SCIENCE PROFESSIONALS

CAS SciFinder Future Leaders

171 alumni, 35 countries and over 120 institutions

acsoncampus.acs.org/resources

ACS Chemistry for Life®

CAS A DIVISION OF THE AMERICAN CHEMICAL SOCIETY

ACS Publications Most Trusted. Most Cited. Most Read.

ACS ON CAMPUS

From ACS Industry Member Programs

- **Industry Matters Newsletter**

  ACS Member-only weekly newsletter with exclusive interviews with industry leaders and insights to advance your career.

  Preview & Subscribe: acs.org/indnews

- in ACS Innovation Hub

  Connect, collaborate, and stay informed about the trends leading chemical innovation

  Join: bit.ly/ACSinnovationhub

ACS Career Navigator: Your Home for Career Services

Whether you are just starting your journey, transitioning jobs, or looking to brush up or learn new skills, the **ACS Career Navigator** has the resources to point you in the right direction.

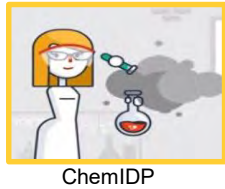
We have a collection of career resources to support you during this global pandemic:

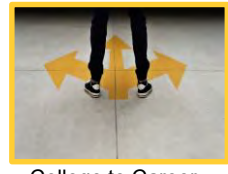

Professional Education


Virtual Career Consultants

ACS Leadership Development System


Career Navigator LIVE!


ChemIDP


College to Career

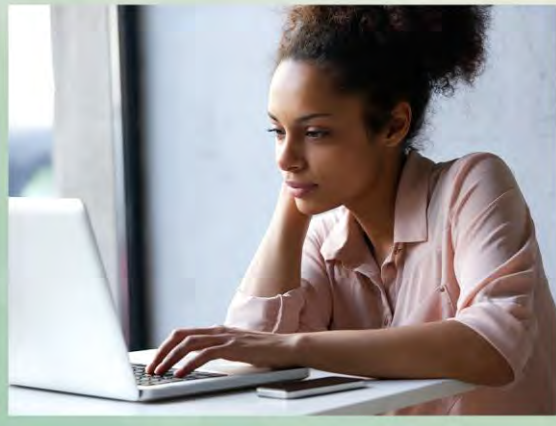
ACS Webinars

Virtual Classrooms

Visit www.ACS.org/COVID19-Network to learn more!

7

Join us in our efforts to increase the diversity of chemistry.



Valued donors like you have sustained ACS educational programs that are welcoming students from diverse backgrounds into our profession.

www.acs.org/donate

ACS Office of Philanthropy
Chemistry for Life®

8

A Career Planning Tool For Chemical Scientists

ChemIDP is an Individual Development Plan designed specifically for graduate students and postdoctoral scholars in the chemical sciences. Through immersive, self-paced activities, users explore potential careers, determine specific skills needed for success, and develop plans to achieve professional goals. **ChemIDP** tracks user progress and input, providing tips and strategies to complete goals and guide career exploration.

https://chemidp.acs.org

9

ACS Bridge Program

Are you thinking of Grad School?

If you are from an underrepresented racial or ethnic group, we want to empower you to get your graduate degree!

The ACS Bridge Program offers:

- **A FREE common application that will highlight your achievements to participating Bridge Departments**
- **Resources to help write competitive grad school applications and connect you with mentors, students, and industry partners!**

Learn more and apply at www.acs.org/bridge

Email us at bridge@acs.org

10

ACS Department of Diversity Programs

Advancing ACS's Core Value of Diversity, Inclusion & Respect

We believe in the strength of diversity in all its forms, because inclusion of and respect for diverse people, experiences, and ideas lead to superior solutions to world challenges and advances chemistry as a global, multidisciplinary science.

Contact Us:
https://app.suggestionox.com/r/DI_R
Diversity@acs.org

@ACSDiversity

ACS Diversity

ACS Voices Diversity Podcast

acsvoices.podbean.com/

www.acs.org/diversity

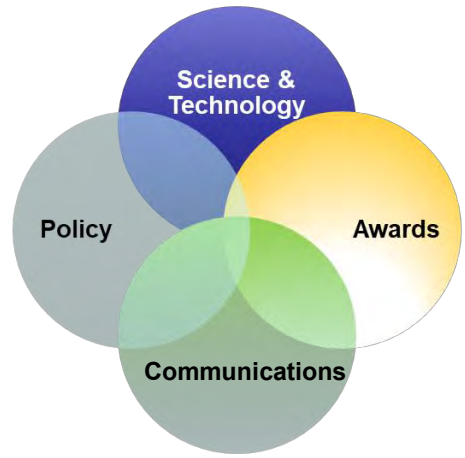
11

Apply by May 31 for the **ACS LEADS Conference**, a 3-day event focused on preparing high-potential early career professionals and students for successful and impactful careers in the chemical enterprise. This event, conceived by ACS Past-President, Luis Echegoyen, will bring together highly esteemed chemists, scientists, professionals, and Nobel Laureates for networking, self-reflection, career exploration, mentoring, and technical discussions.

12

ACS Committee on Science (COMSCI)

"The ACS Committee on Science aims to ***engage the global chemistry enterprise to build a better tomorrow*** by identifying new frontiers of chemistry, examining the scientific basis of, and formulate public policies related to, the chemical sciences, and recognizing outstanding chemical scientists."



https://www.acs.org/content/acs/en/about/governance/committees/science.html

13

ACS Webinars

CLICK • WATCH • LEARN • DISCUSS

Date: Wednesday, June 2, 2021 @ 2-3pm ET
Speakers: James Collins, MIT / Jürgen Cox, Max Planck Institute of Biochemistry / Yugal Sharma, CAS
Moderator: Angela Zhou, CAS

Register for Free!

What You Will Learn:

- What are the categories of machine learning (supervised, unsupervised, and reinforcement learning) and emerging trends within chemistry
- Why certain areas of machine learning have grown faster than others in the chemical space
- What are the key challenges that need to be addressed for faster innovation and more development

Co-produced with: CAS

Date: Thursday, June 3, 2021 @ 2-3pm ET
Speaker: Paul Hodges, New Normal Consulting
Moderator: Bill Carroll, Caroll Applied Science

Register for Free!

What You Will Learn:

- How businesses can be more successful by taking a more holistic view of the environment in which they operate
- How companies are refocusing due to the shifts in consumer demand and the need to work towards a greener economy
- A macro examination of the state of the global economy and the implications for the US and other countries

Co-produced with: ACS Industry Member Programs and ACS Division of Business Development and Management

Date: Thursday, June 10, 2021 @ 2-3pm ET
Speakers: Siddharth Patwardhan, The University of Sheffield (UK)
Moderator: David Constable, American Chemical Society

Register for Free!

What You Will Learn:

- Why the understanding bio-nano interface is a powerful basis for designing bioinspired syntheses of functional nanomaterials
- How careful design of bioinspired nanomaterials can provide commercially relevant products
- Why process chemistry, scale-up and downstream processing are equally important in reaching the markets

Co-produced with: ACS Green Chemistry Institute

www.acs.org/acswebinars

14

ACS Chemistry for Life®

ACS President H.N. Cheng Presents: FRONTIER FRIDAYS

co-produced with the ACS Committee on Science

Skin-Inspired Organic Electronics

FREE Webinar | TODAY at 1pm ET

ACS Webinars CLICK • WATCH • LEARN • DISCUSS

THIS ACS WEBINAR WILL BEGIN SHORTLY . . .

15

ACS Webinars CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Skin-Inspired Organic Electronics

ZHENAN BAO
K.K. Lee Professor of Chemical Engineering & Chair, Dept. of Chemical Engineering and by courtesy, Professor of Chemistry & Professor of Materials Science and Engineering, Stanford University

H.N. CHENG
President,
American Chemical Society

YOUNG-SHIN JUN
Professor, Depart. of Energy, Environmental & Chemical Engineering, Washington University in St. Louis

Presentation slides are available now! The edited recording will be made available as soon as possible.

www.acs.org/acswebinars

This ACS Webinar is co-produced with the ACS Committee on Science.

16

Presidential Theme – Growth, Collaboration and Advocacy

- **Chemistry is a central science.** A strong and growing global chemistry enterprise is good for the profession and its members
- **Some possible actions:**
  - Innovation, new frontiers, new applications
    - Entrepreneurship, industrial engagement
  - Sustainability and green chemistry
  - International partnership and mutual assistance
  - Collaboration
- **Need continued public and government support**

New Frontiers and Opportunities for Chemistry

- Chemistry continues to be a productive field, with new or expanded areas where future chemists and chemical engineers can find exciting opportunities
- Chemistry is also becoming multidisciplinary, and many innovations are found at the interfaces of two or more disciplines
- The goal of the Presidential – Committee on Science Webinar Series and Symposium is to highlight some of the major growth and emerging areas of chemistry, to provide the opportunity to meet the foremost leaders in these areas, and to inform our members and students as to the future directions of chemistry
- Thanks are due to Professor Zhenan Bao, ACS Committee on Science (particularly Young-Shin Jun, Michael Morello, Martin Kociolek, and Mary Kirchhoff) and the ACS webinar team for their critical role in making these webinars possible.

New Frontiers and Opportunities for Chemistry

ACS Chemistry for Life®

ACS New Frontiers Symposium at ACS National Meeting on August 22-24

34 speakers in **9** sessions (all virtual) covering advanced materials, catalysis, nanotechnology, biotechnology, biomedical, electronics, environmental chemistry, advanced food technology, and sustainability.

The first session will start on **Sunday, August 22, at 2:00pm EDT**, and will run continuously until Tuesday, **August 24 at 6:30pm EDT.**

New Frontiers and Opportunities for Chemistry

ACS Chemistry for Life®

ACS **"Frontier Friday"** Webinars in May and June

5/28/2021: **Dr. Zhenan Bao**, Stanford University,
"Skin-Inspired Organic Electronics"

6/11/2021: **Dr. Amy Prieto**, Colorado State University,
"Lithium-ion Batteries: The Road to Sustainable Energy Storage"

6/25/2021: **Sir Fraser Stoddart**, Northwestern University,
"Artificial Molecular Machines: Going from Solution to Surfaces"

Zhenan Bao, Featured Speaker

ACS Chemistry for Life®

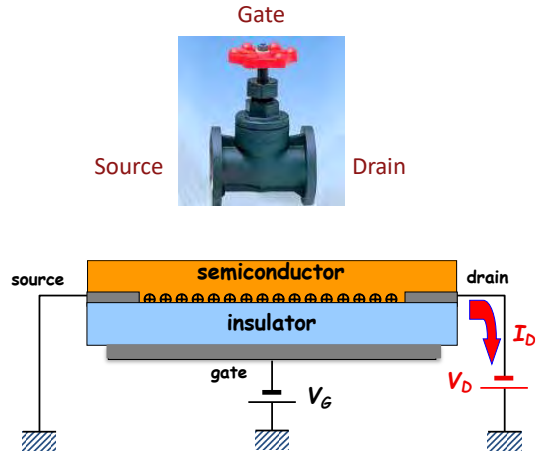
- Ph.D. degree in Chemistry (University of Chicago, 1995); Materials Research Department of Bell Labs, Lucent Technologies (1995-2004)
- Stanford University, Department Chair, and K.K. Lee Professor in Chemical Engineering
- More than 600 refereed publications and more than 65 US patents
- Member of National Academy of Engineering, American Academy of Arts and Sciences, and National Academy of Inventors
- Founder and Faculty Director of Stanford Wearable Electronics Initiative (eWEAR); Affiliated faculty member of Precourt Institute, Woods Institute, ChEM-H and Bio-X. Founder and current member of the Board of Directors of C3 Nano Co. and PyrAmes
- Executive Committee Member for PMSE. Exec Board Member the Materials Research Society; Associate Editor for *Chemical Science*, *Polymer Reviews,* and *Synthetic Metals*
- Recipients of many awards and recognition, including ACS Gibbs Medal (2020), ACS Applied Polymer Science Award (2017), ACS Creative Polymer Chemistry Award (2013), ACS Cope Scholar Award (2011), and ACS Team Innovation Award (2001)

Outline

- Motivation
- Skin-inspired electronic material design and devices
- Skin-inspired electronics applications
- Summary and future outlooks

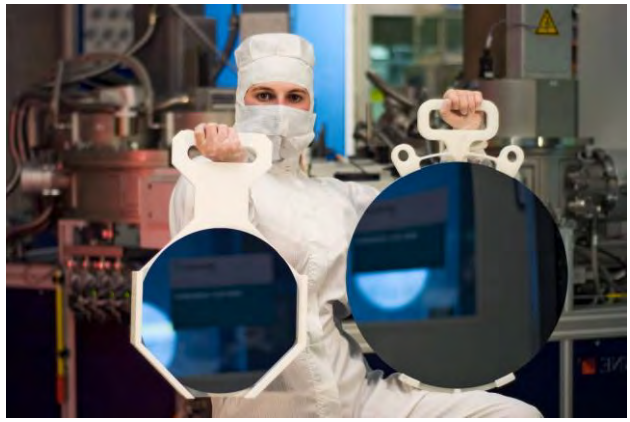
Transistors

1st transistor invented in Bell Labs, 1947



Bao and Locklin, *Organic Field-effect Transistors,* CRC Press, 2007

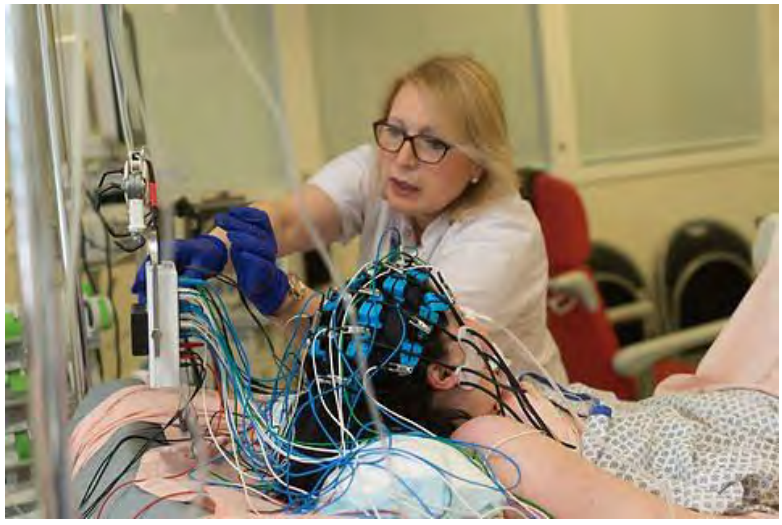
Today's Electronics



Rigid

Brittle

Today's Diagnosis and Monitoring Devices



https://www.popularmechanics.com

https://aasm.org

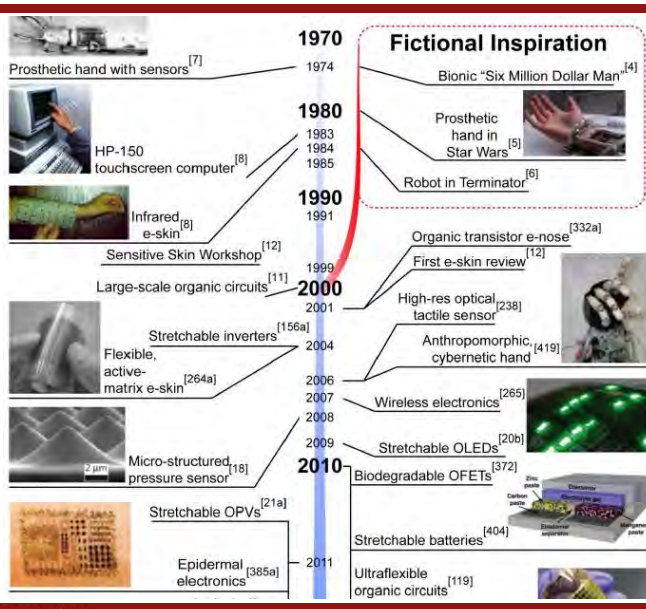
Today's Implantable


Pacemaker


https://www.tabers.com

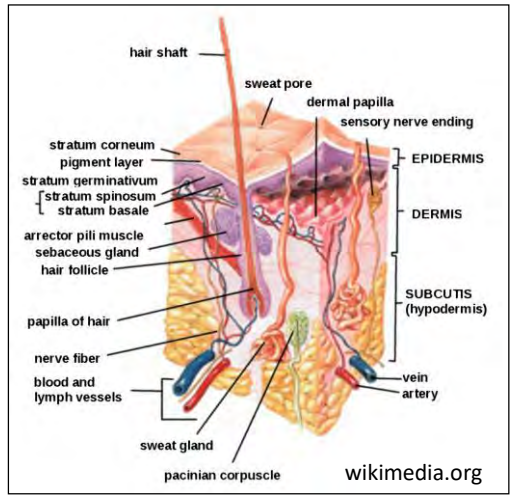

Spinal cord stimulator

Skin as an inspiration for electronic devices



Hammock, Chortos, Tee, Tok and Bao, *Adv. Mater.* 2013

Skin as an inspiration for electronic materials



Sensing Functions

- Touch
- Temperature
- Humidity

Material Properties

- Flexible
- Stretchable
- Biodegradable
- Self healing

A. Chortos and J. Liu, Z. Bao, **Nature Materials**, 15, 937-950, 2016, V. R. Feig, H. Tran, Z. Bao, **ACS Cent. Sci.** , 4, 3,337–348, 2018
J. C. Yang, J. Mun, S. Y. Kwon, S. Park, Z. Bao, S. Park, **Adv. Mater.**, 1904765, 2019

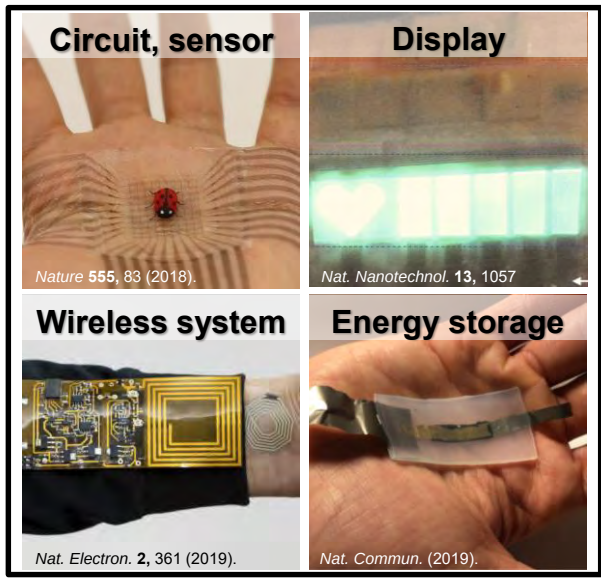
Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

What applications do you think skin-inspired electronics can enable? (Select all that apply)

- Wearables
- Implantable
- Robotic skin
- None of the above

Ultimate Wearables

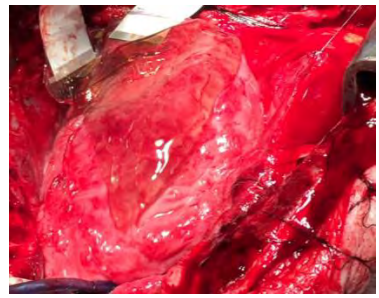


Sensing

Adding sensing to robotic hand

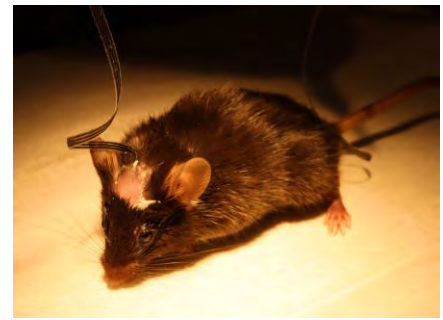
C.M. Boutry, Z. Bao et al. **Sci. Robotics** 2018;3:eaau6914

High-resolution electrical recording from heart



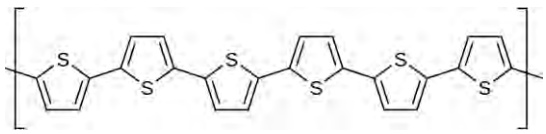
J. Liu, Z. Bao et al. **PNAS** 2020

Neurotransmitter sensor

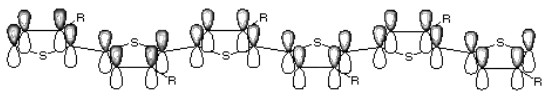


Li, Liu, Chen, Bao, et al. under revision

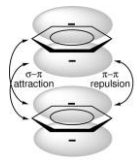
The possibility offered by ***conjugated polymers***



Conjugation of π-orbitals for intra-chain transport

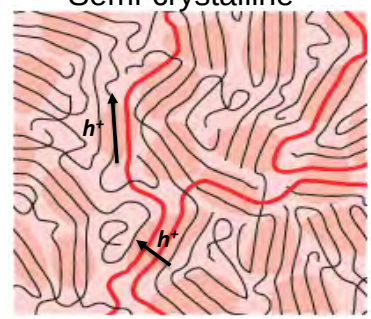


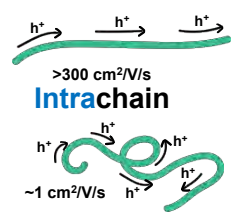
π- π stacking for inter-chain transport:

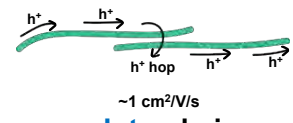


Rodrigo *et al.*, *Nat. Mater.* **2013**, *12*, 1038

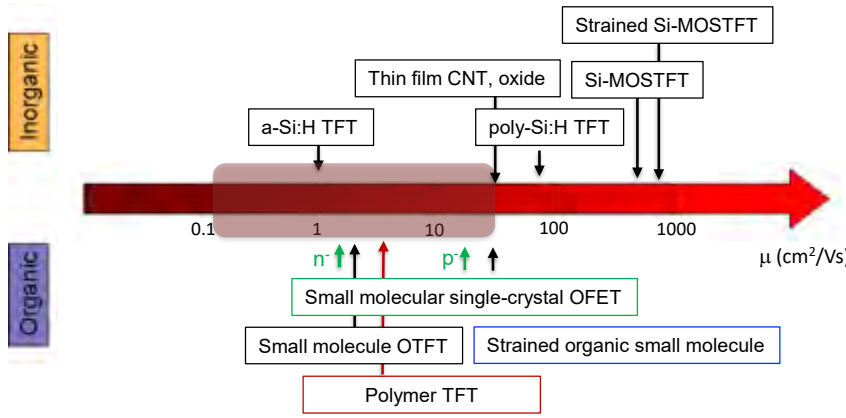
Semi-crystalline



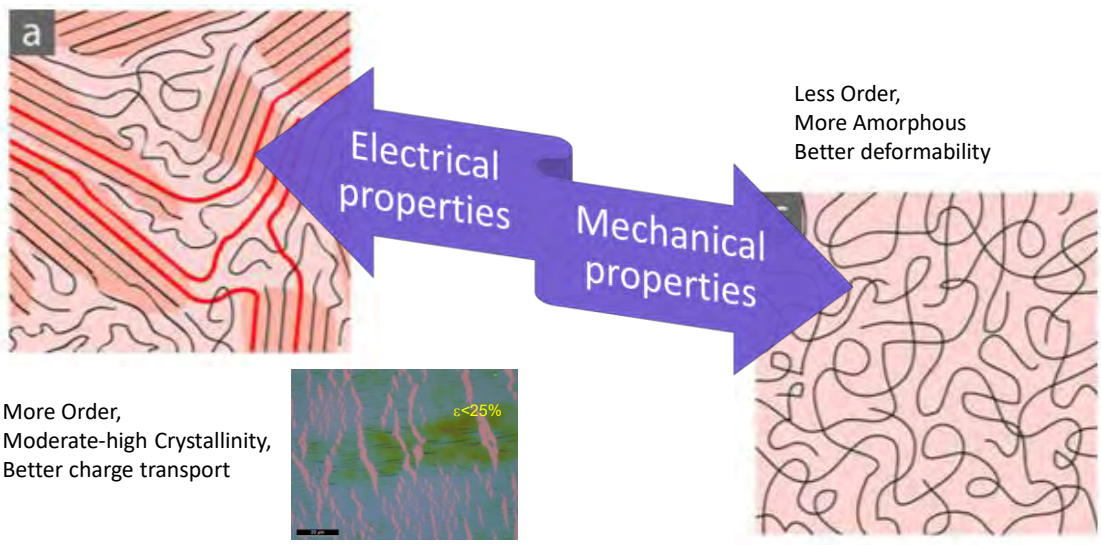




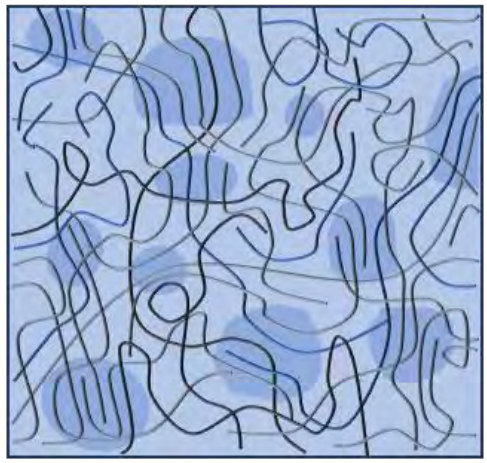
Charge carrier mobility of organics and polymers



Mutually exclusive - plastic or electronic?



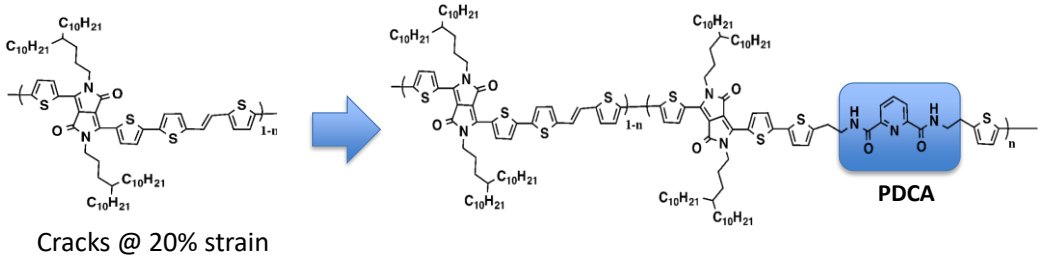
Mechanical Energy Dissipation Mechanisms



- Molecular rotation, chain elongation
- Chain alignment
- Crystal re-orientation
- Crystal breakage – likely irreversible
- Bond breakage - irreversible

Y. Zheng, Z. Bao et al., **Adv. Funct. Mater.**, 2019.
J. Mun, Z. Bao et al., **Adv. Mater.**, 2019
Y. Zheng, M. Ashizawa, Z. Bao et al., **Chem. Mater.**, 2020

Molecular design for stretchable polymer semiconductor



Cracks @ 20% strain


Simon Rondeau-Gagné
(Now Prof. U. Winsor -Canada)


Yu-Cheng Chiu
(Now Prof. N Taiwen STU)

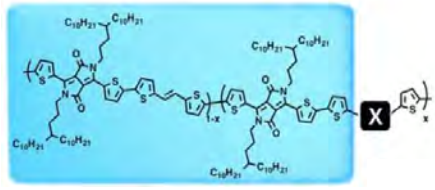

Jinyoung Oh
(Now Prof. Kyung Hee U.-Korea)

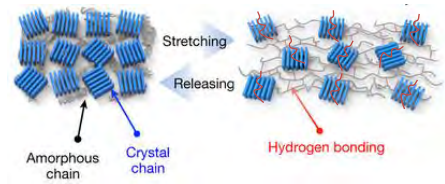
Increase disorder, more amorphous domains: partial break of conjugation

Add reversible bonds: H-bonding sites

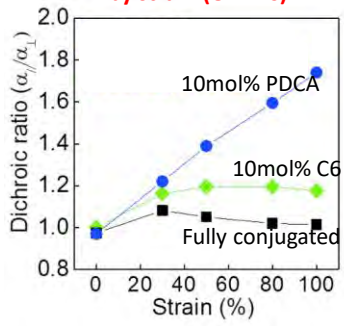
Oh*, Rondeau-Gagne*, Chiu*, Bao, **Nature**, 2016.

Energy dissipation mechanisms under strain

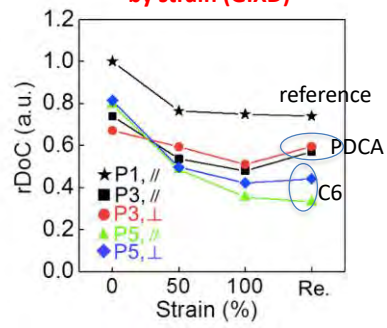




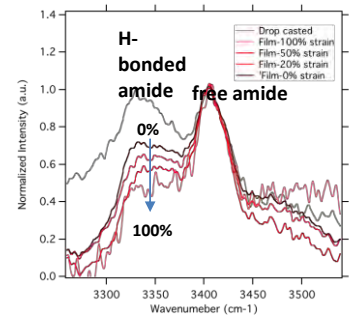
Polymer chain aligned by strain (UV-Vis)



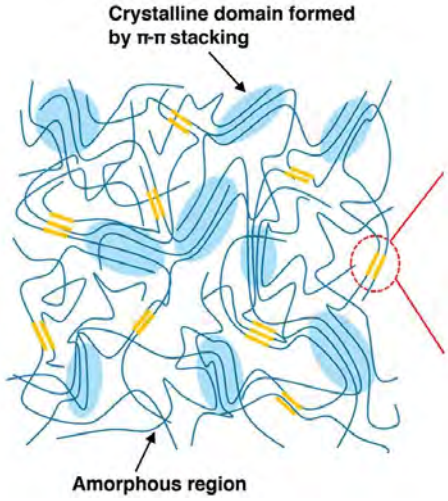
Breaking crystallites by strain (GIXD)

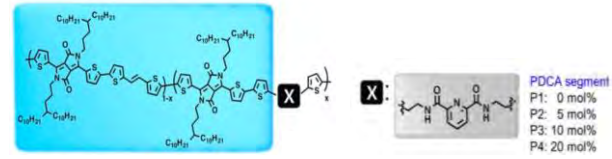


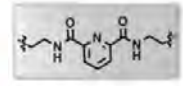
Breaking H-bonding by strain (FTIR)

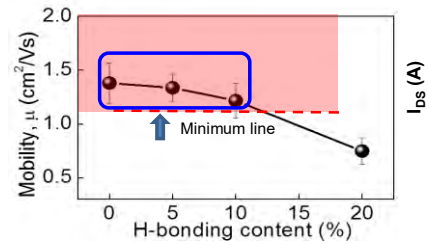


Maintain good charge transport

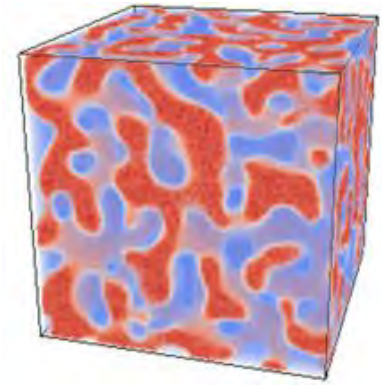


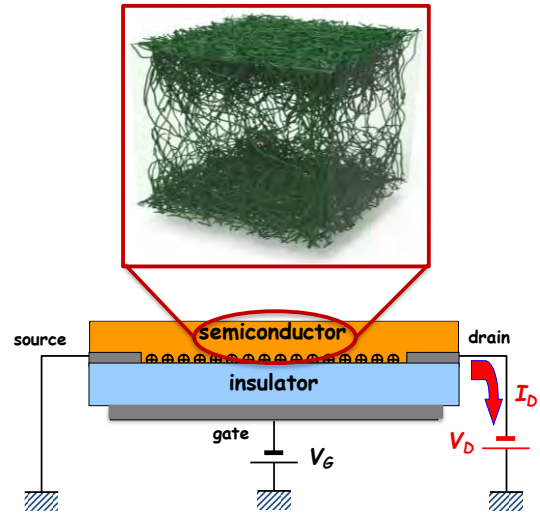




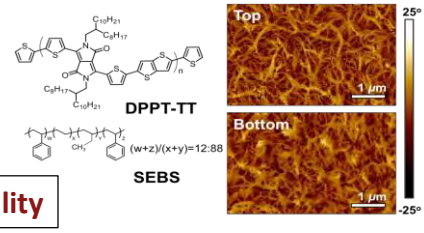


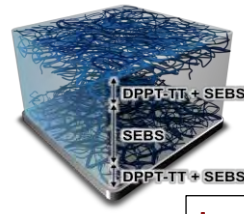
Can we have a mobility boost?





Nanoconfinement in polymer blend (CONPHINE)



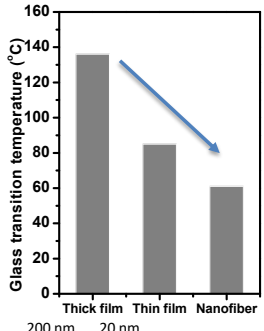


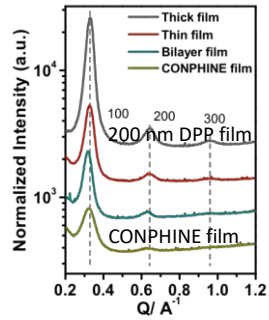
Jie Xu
(Now Argon NL)

Sihong Wang
(Now Prof. U. Chicago)

High stretchability

Increased chain dynamics (decreased T_g)

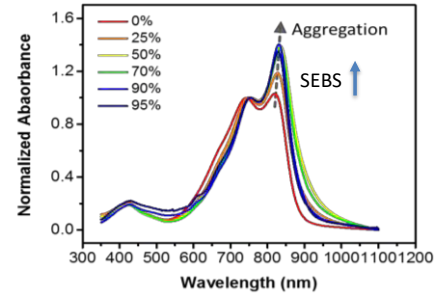




Decreased crystallinity

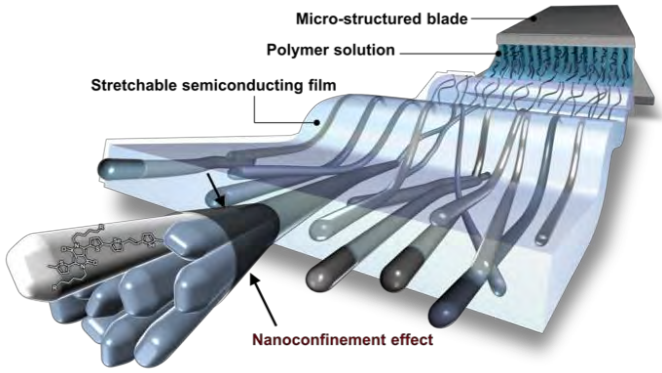
J. Xu#, S. Wang#, Z. Bao et al. **Science** 2017

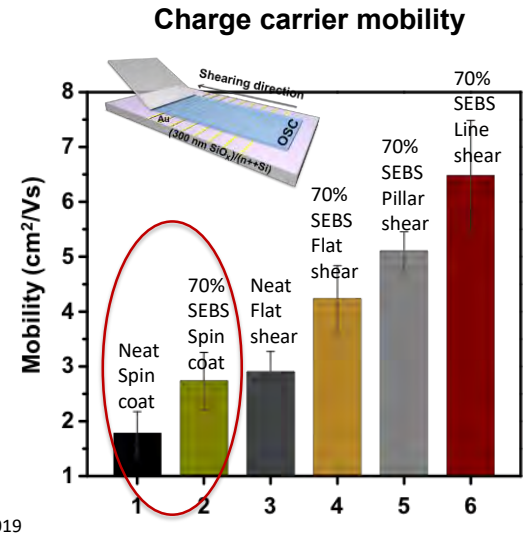
Increased mobility



J. Xu, H. Wu, Z. Bao, et al. **Nature Materials**, 2019

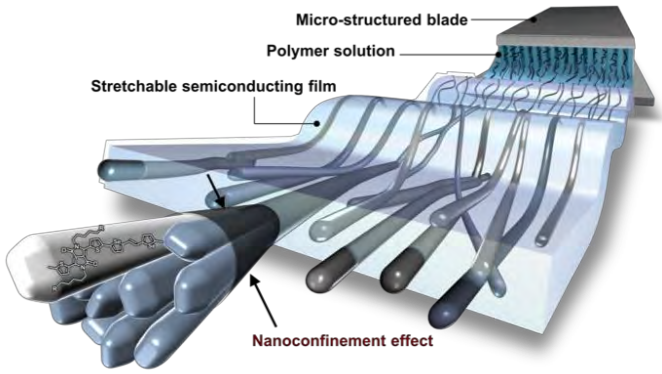
Multiscale ordering for enhanced charge carrier mobility

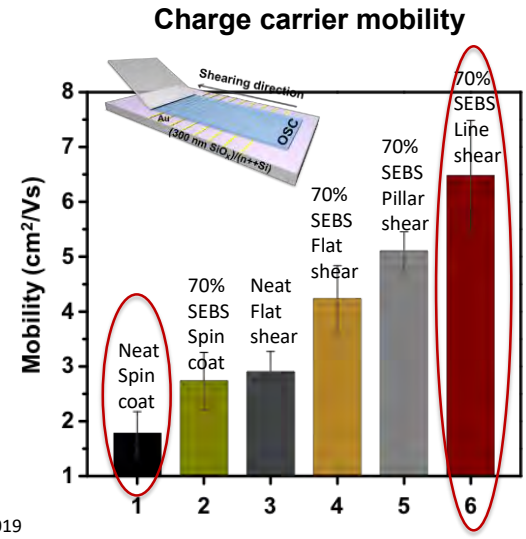




J. Xu, H. Wu, Z. Bao, et al. **Nature Materials**, 2019

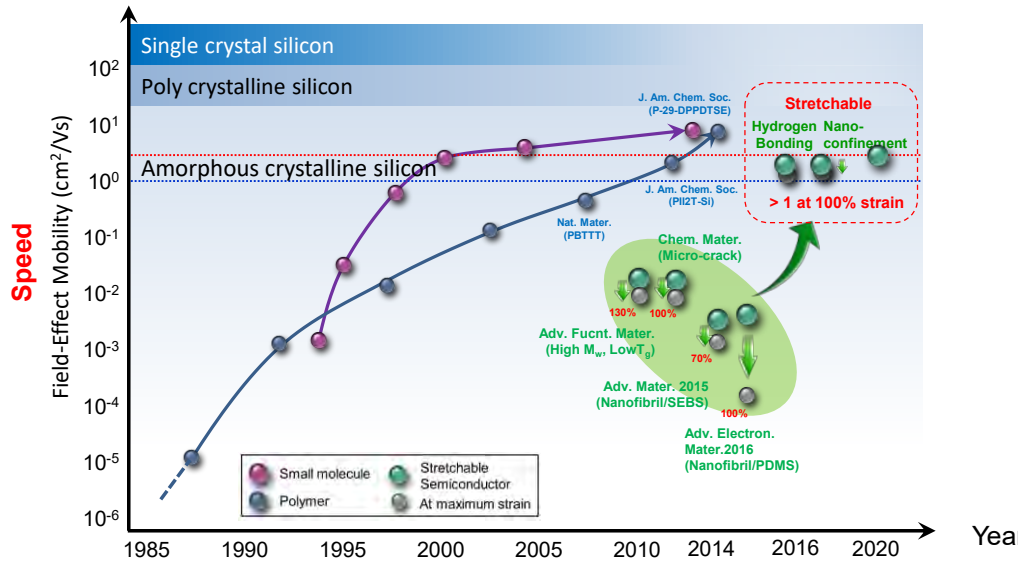
Multiscale ordering for enhanced charge carrier mobility



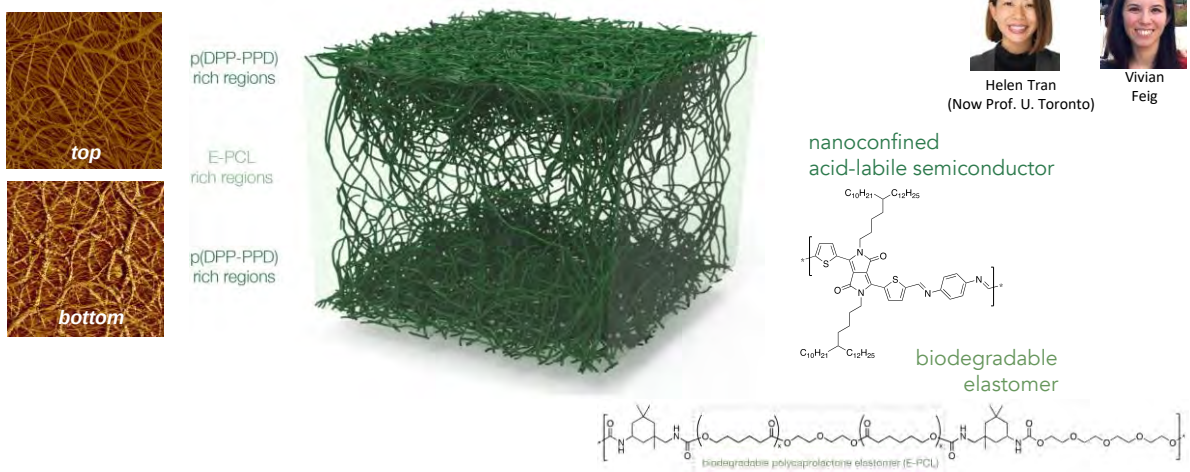


J. Xu, H. Wu, Z. Bao, et al. **Nature Materials**, 2019

Stretchable polymer semiconductors have Comparable mobility as best organic semiconductors



Biodegradable Elastic Semiconductor

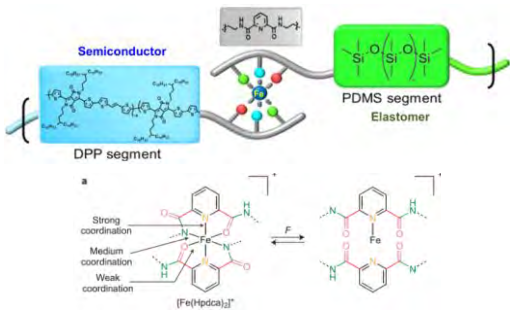


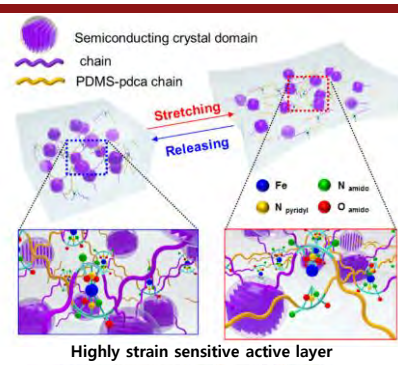
Helen Tran (Now Prof. U. Toronto)

Vivian Feig

H. Tran, V. Feig, Z. Bao et al., **ACS Central Science** 2019

Stretchable and Self-Healable Active Layer

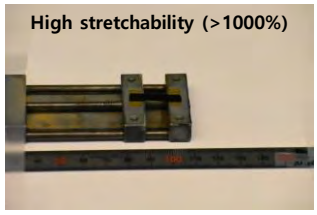


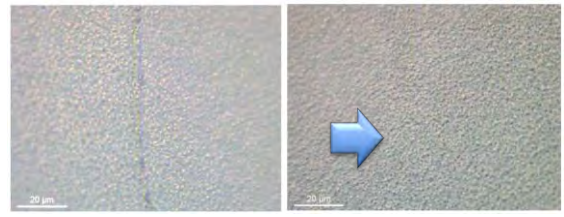


Highly strain sensitive active layer

Jinyoung Oh
(Now Prof. Kyung Hee U.-Korea)

Donghee Son
(Now Prof. SKKU-Korea)

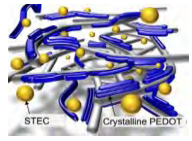




Autonomous self-healing

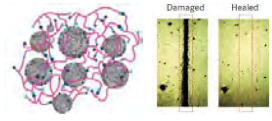
Oh, Son, Bao et al. **Science Advances** 2019: Vol. 5, no. 11, eaav3097

Skin Inspired Electronic Materials



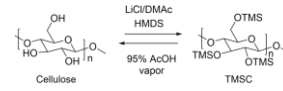
Science Advances, 3, 3, 2017
Nature Biomedical Engineering, 2019

conductor



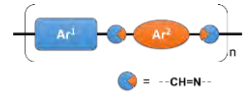
Nature Nanotech. 7 , 825, 2012
Nature Nanotech. 2018

conductor



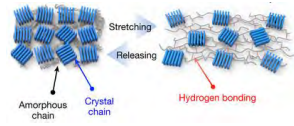
Substrate

PNAS, 2017



Science, 355, 59, 2017
Nature Materials 2019

Semiconductor



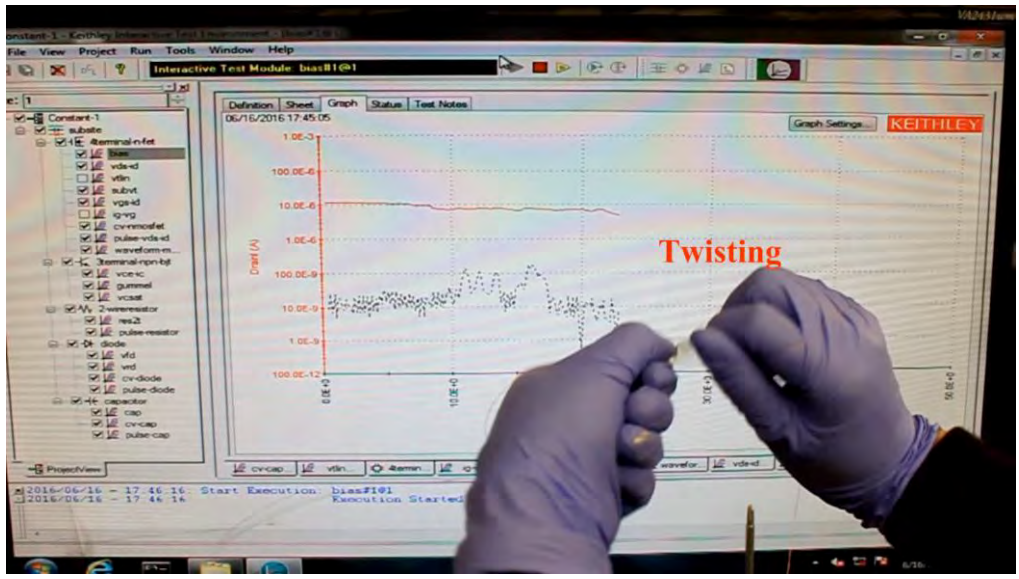
Nature, 539, 411, 2016

Semiconductor

PNAS, 2017 ACS Central Science 2019

Semiconductor

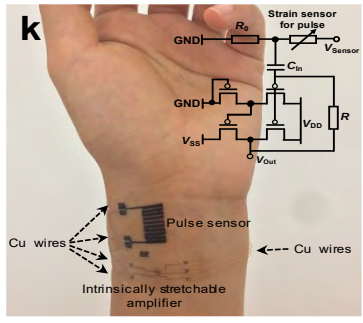
Stretchable Transistors and Circuits

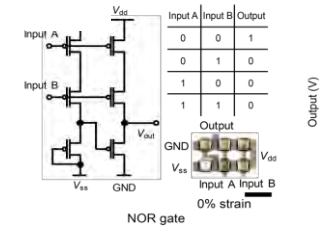


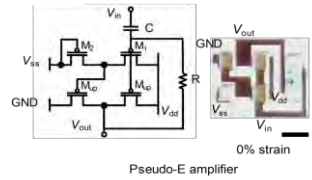
Wang, Xu, Bao et al. **Nature**, 2018

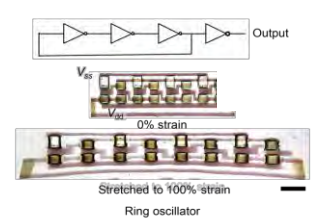
Stretchable Circuit Blocks

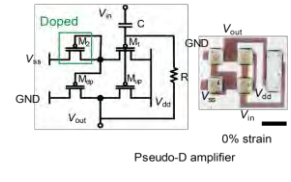
Amplifier circuit for sensors












Weichen Wang

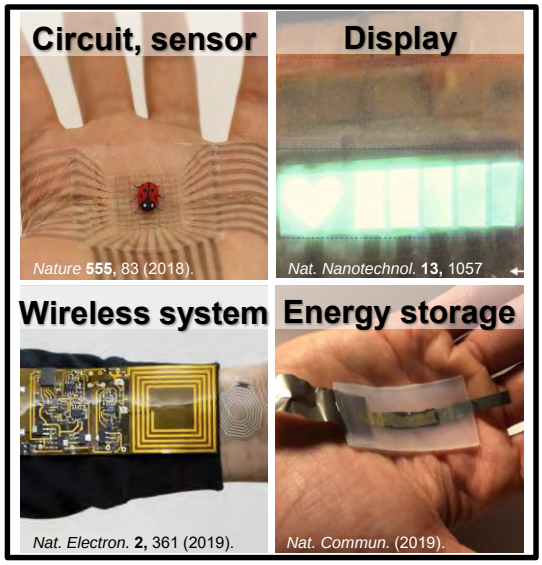

Sihong Wang


Chenxin Zhu


Murmann

Zhu, Murmann, Bao et al. **Nature Electronics** 2018
Wang, Wang, Bao et al. **Nature Electronics**, 2021

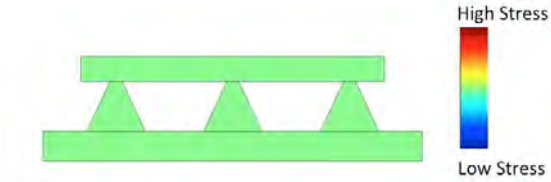
Stretchable Components



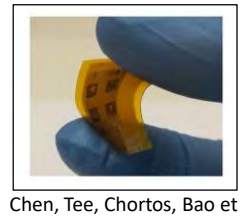
- Transistor array density :
  - 347 /cm^2 => 42,000 /cm^2 => 100,000 /cm^2
- 13.5 MHz diodes
- Polymer LED
- Polymer PV
- Lithium-ion battery
- Temperature, pressure, strain, humidity, neurotransmitter sensors
- Passive wireless sensor tag

E-Skin Sensors

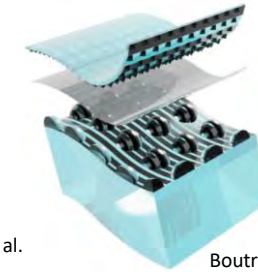
Pressure sensors



Mannsfeld, Tee, Bao et al., **Nature Materials**, 2010

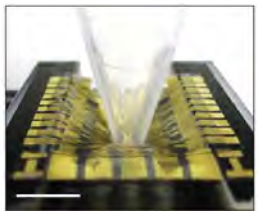


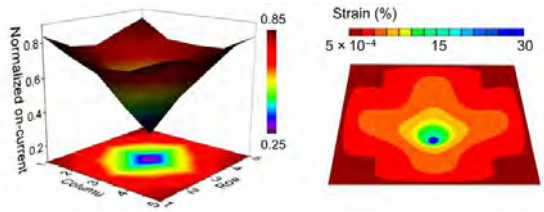
Chen, Tee, Chortos, Bao et al. **Nature Comm**., 2014



Boutry, Bao et al. **Sci. Robotics,** 2018

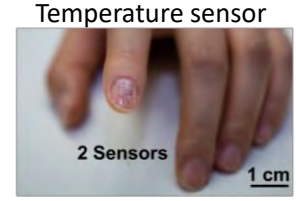
Strain sensor





Oh, Son, Bao et al. **Science Advances** 2019

Temperature sensor



Zhu, Bao, Murmann, et al. ***Nature Electronics,*** 2018

Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

Where would you use e-skin on or inside body?

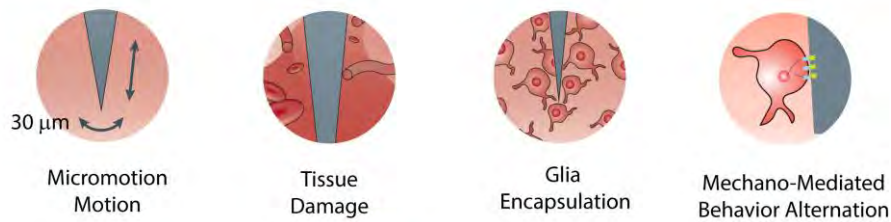
(Select all that apply)

- On skin
- On beating heart
- Wrap around nerve
- None of the above

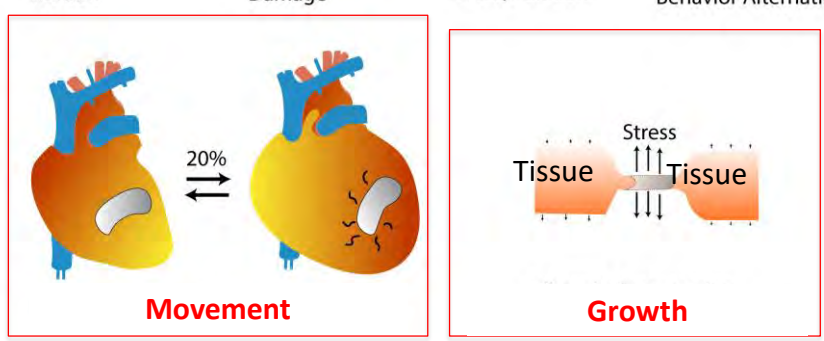
55

Skin-inspired electronic materials: tissue-electronics interface

Modulus Mis-match



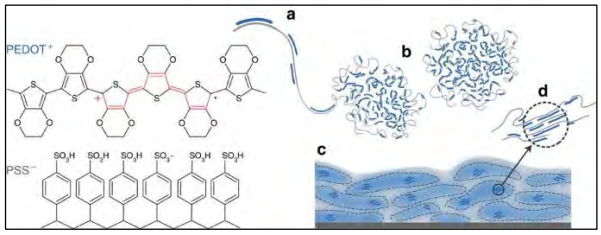
Dynamic movement Change in size



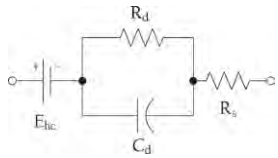
Chen et al Nature Reviews Materials 2017

Electrode-Tissue Contact

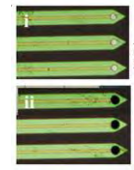
Conducting polymer: dual electronic and ionic conductor



Rivnay, J., Inal, S., Collins, B., Malliaras, G. *et al. Nat Commun* **7,** 11287 (2016)

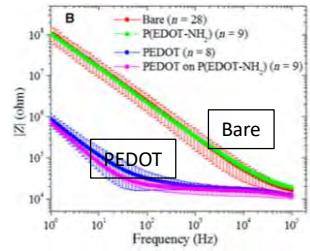


Lower bio-interfacial impedance



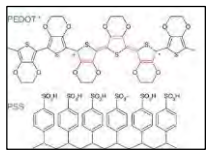
Bare
(Metal only)

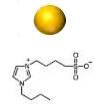
With PEDOT
(conducting polymer)



Ouyang, L., Martin, D. et al. Science Advances 03 Mar 2017: Vol. 3, no. 3, e1600448

Stretchable Conducting PEDOT Polymer





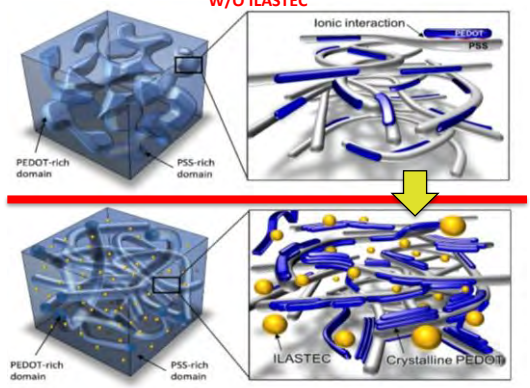
ILASTEC enhancer:

- Doping
- Tuning morphology
- Plasticizing

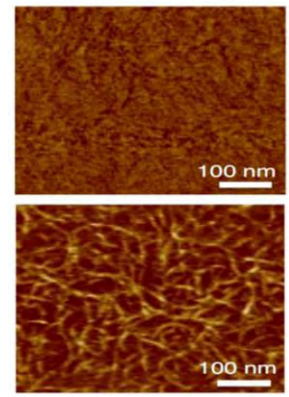
4100 S/cm @ 100% strain
(thin film on PDMS)

Jessica Wang

W/O ILASTEC



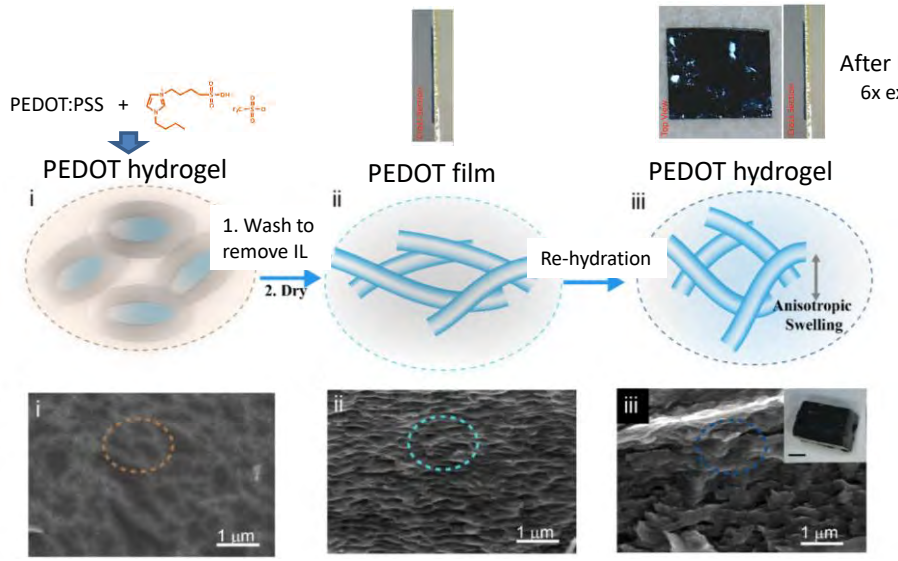
With ILASTEC



Film AFM after removing water

Wang, Bao, **Science Advance,** 2017

Highly Conductive Hydrogel Preparation



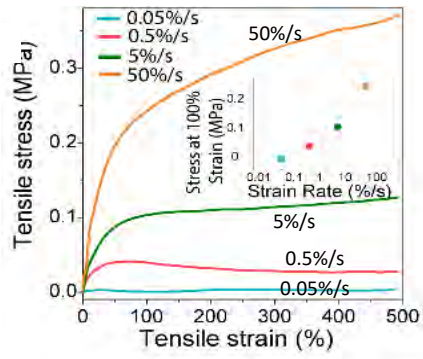
Yuxin Liu

Y. Liu, J. Liu, Z. Bao et al Nature Biomedical Engineering 2019

Electronics that grows with human: morphing electronics MorphE

Nerve growth rate (~ 2×10^{-5} %/s in rat)
Multiple times increase in size

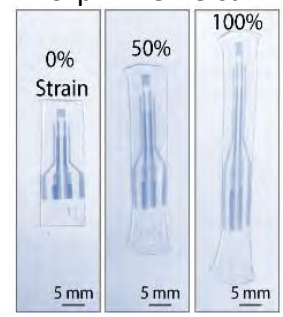
Stress-strain curve

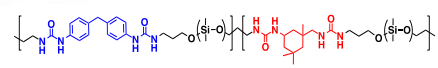


Yuxin Liu (Now AStar)

Jinxing Li (now Prof. MSU)

MorphE nerve cuff

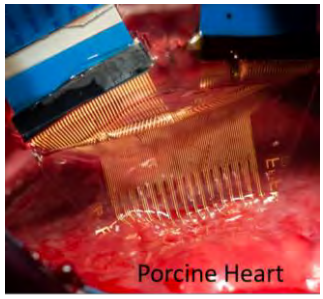




MPU0.4 IU0.6

Y. Liu* J. Li*, S.Song* P. George, Z. Bao et al **Nature Biotechnology**, 2020

Cellular resolution large area electrophysiological mapping

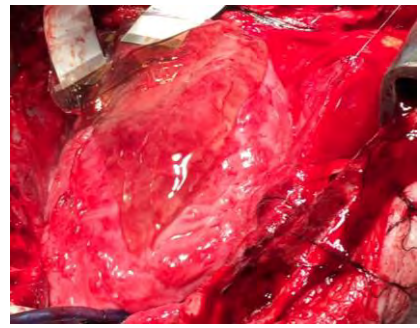


Y. Liu, J. Liu, Z. Bao et al. **Nat. Bio Med.** 2020

Kim, D. H. Rogers, J.A. *et al* ***PNAS*** 2012.

With dynamic movement

Pig heart

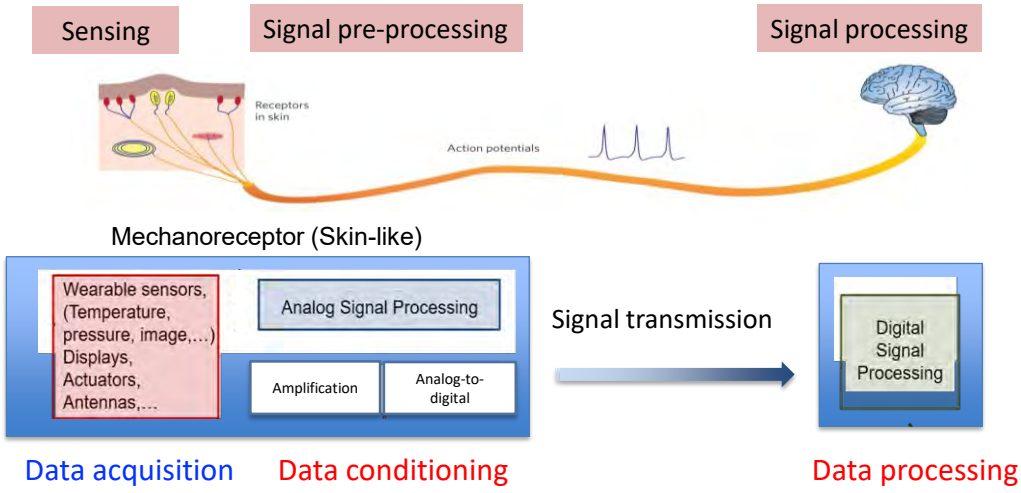


J. Liu, Z. Bao et al. **PNAS** 2020

Muscle

Y. Jiang, Z. Bao et al

Our vision for artificial *e*-skin system



Tee, Chortos, Deisseroth, Ng, Bao et al., **Science**, Oct. 16, 2015, Chortos, Liu, Bao, **Nature Materials**, 15, 937-950, 2016
Kim, Chortos, Xu, Bao, Lee, et al. **Science**, 2018

Summary

Mimicking e-skin functions

↓

Skin-inspired electronic materials

↓

Define artificial e-skin system

→

- Robotic skin
- Wearable electronics
- Implantable electronics

- Medical device - monitoring
  - Neonatal blood pressure monitor
    (FDA breakthrough device designation)

- Lithium metal coating, solid state electrolyte
- Sustainable plastic electronics

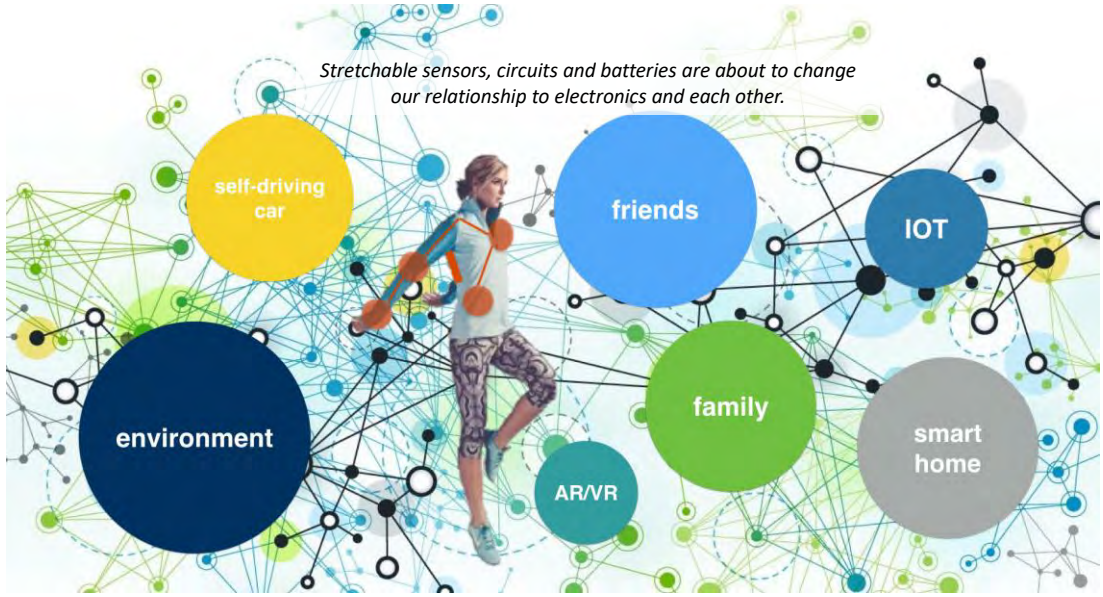
Unobtrusive 'elastronic' transistors can behave like skin and stretch without tearing. Credit: Bao Lab

Bring on the bodyNET

Skin-like sensors, circuits and batteries are about to change our relationships with electronics and each other

Nature, September 21, 2017
Nature Electronics, 2019

Skin-like electronics: connecting digital world to physical world



Chu, Chang, Burnette, Bao, **Nature**, September 21, 2017

65

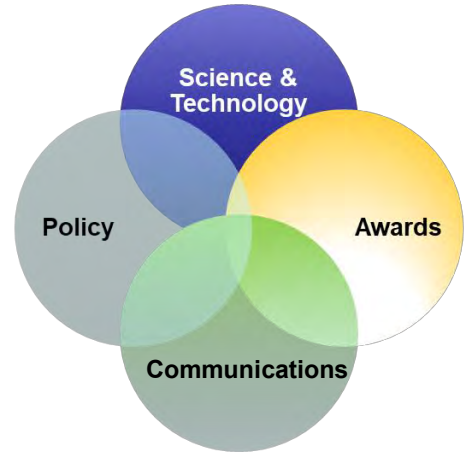
AFOSR, ONR, NSF, DOE-BES, DOE-EERE, DARPA
Gates Foundation, XEROX Foundation
Sloan Foundation, Dreyfus Foundation
Samsung Electronics, BICI-Flexible Electronics Center
Stanford Bio-X
Stanford Wu Tsai Neuroscience Institute
Stanford ChEM-H
Stanford Wearable Electronics Initiative (eWEAR)
Stanford Precision Health and Integrated Diagnosis (PHIND)
Stanford Precourt Institute for Energy
Stanford TomKat Center for Sustainable Energy

Wei Cai (ME); Xiaoke Chen (Biology); Bianxiao Cui (CHemistry); Yi Cui (MSE); Mark Cutkosky (ME); Karl Deisseroth (BioE); Paige Fox (Surgery); Sanjiv S. Gambhir (Ridiology); Paul George (Surgery); Anson Lee (Cardiology); Boris Murmann (EE); Pablo Parades (Psychiatry); Sergiu Pacal (Psychiatry); Ada Poon (EE); Jian Qin (ChemE); Alberto Salleo (MSE); Xiaodong Chen (NTU, Singapore); Dean M. DeLongchamp (NIST); Giulia Galli (UChicago); Enrique Gomez (Penn State); Uyong Jeong (POSTECH); Tae Woo Lee (SNU); Samira Siahrostami (U. Calgary)

66

ACS Committee on Science (COMSCI)

"The ACS Committee on Science aims to ***engage the global chemistry enterprise to build a better tomorrow*** by identifying new frontiers of chemistry, examining the scientific basis of, and formulate public policies related to, the chemical sciences, and recognizing outstanding chemical scientists."



https://www.acs.org/content/acs/en/about/governance/committees/science.html

68

ACS Chemistry for Life®

ACS President H.N. Cheng Presents: FRONTIER FRIDAYS

co-produced with the ACS Committee on Science

Skin-Inspired Organic Electronics

FREE Webinar | TODAY at 1pm ET

ACS Webinars CLICK • WATCH • LEARN • DISCUSS

ASK YOUR QUESTIONS AND MAKE YOUR COMMENTS IN THE QUESTIONS PANEL NOW! 69

ACS Webinars CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®

Skin-Inspired Organic Electronics

ZHENAN BAO
K.K. Lee Professor of Chemical Engineering & Chair, Dept. of Chemical Engineering and by courtesy, Professor of Chemistry & Professor of Materials Science and Engineering, Stanford University

H.N. CHENG
President,
American Chemical Society

YOUNG-SHIN JUN
Professor, Depart. of Energy, Environmental & Chemical Engineering, Washington University in St. Louis

Presentation slides are available now! The edited recording will be made available as soon as possible.

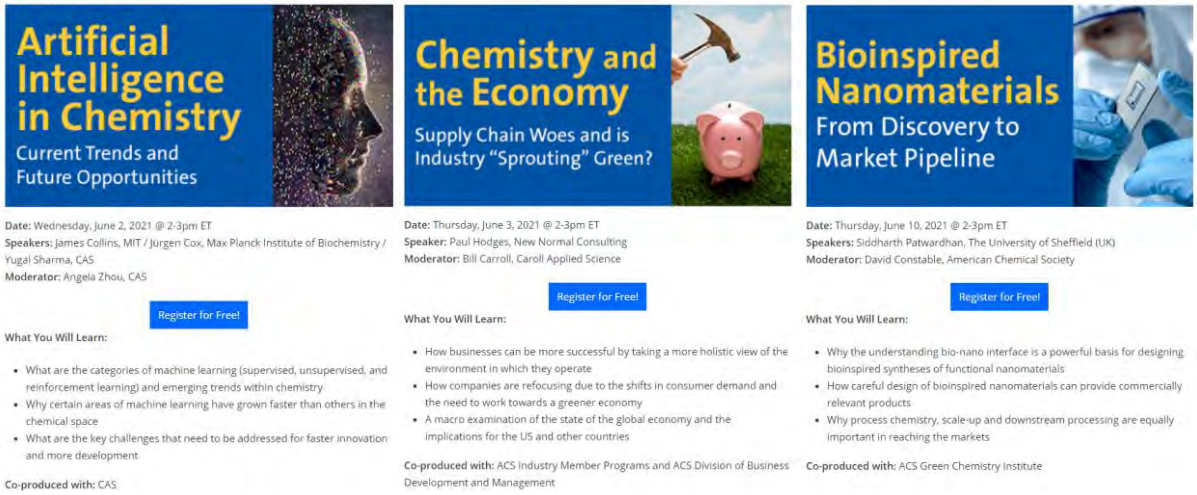
www.acs.org/acswebinars

This ACS Webinar is co-produced with the ACS Committee on Science.

70

ACS Webinars
CLICK • WATCH • LEARN • DISCUSS

ACS Chemistry for Life®



www.acs.org/acswebinars

71

Learn from the best and brightest minds in chemistry! Hundreds of webinars on diverse topics presented by experts in the chemical sciences and enterprise.

Edited Recordings are an exclusive ACS member benefit and are made available once the recording has been edited and posted.

Live Broadcasts of ACS Webinars® continue to be available to the general public several times a week generally from 2-3pm ET!

A **collection of the best recordings** from the ACS Webinars Library will occasionally be rebroadcast to highlight the value of the content.

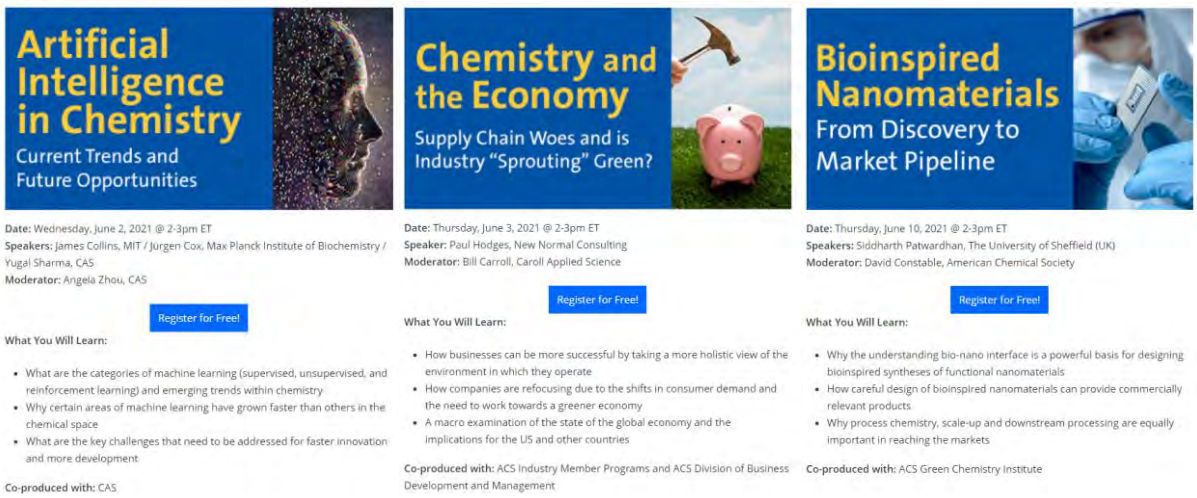
www.acs.org/acswebinars

72

ACS Webinars®does not endorse any products or services. The views expressed in this presentation are those of the presenter and do not necessarily reflect the views or policies of the American Chemical Society.

Contact ACS Webinars ® at acswebinars@acs.org

73



www.acs.org/acswebinars

74