Let’s talk about Materials Science!

Andrew R. Ericks

University of California, Santa Barbara

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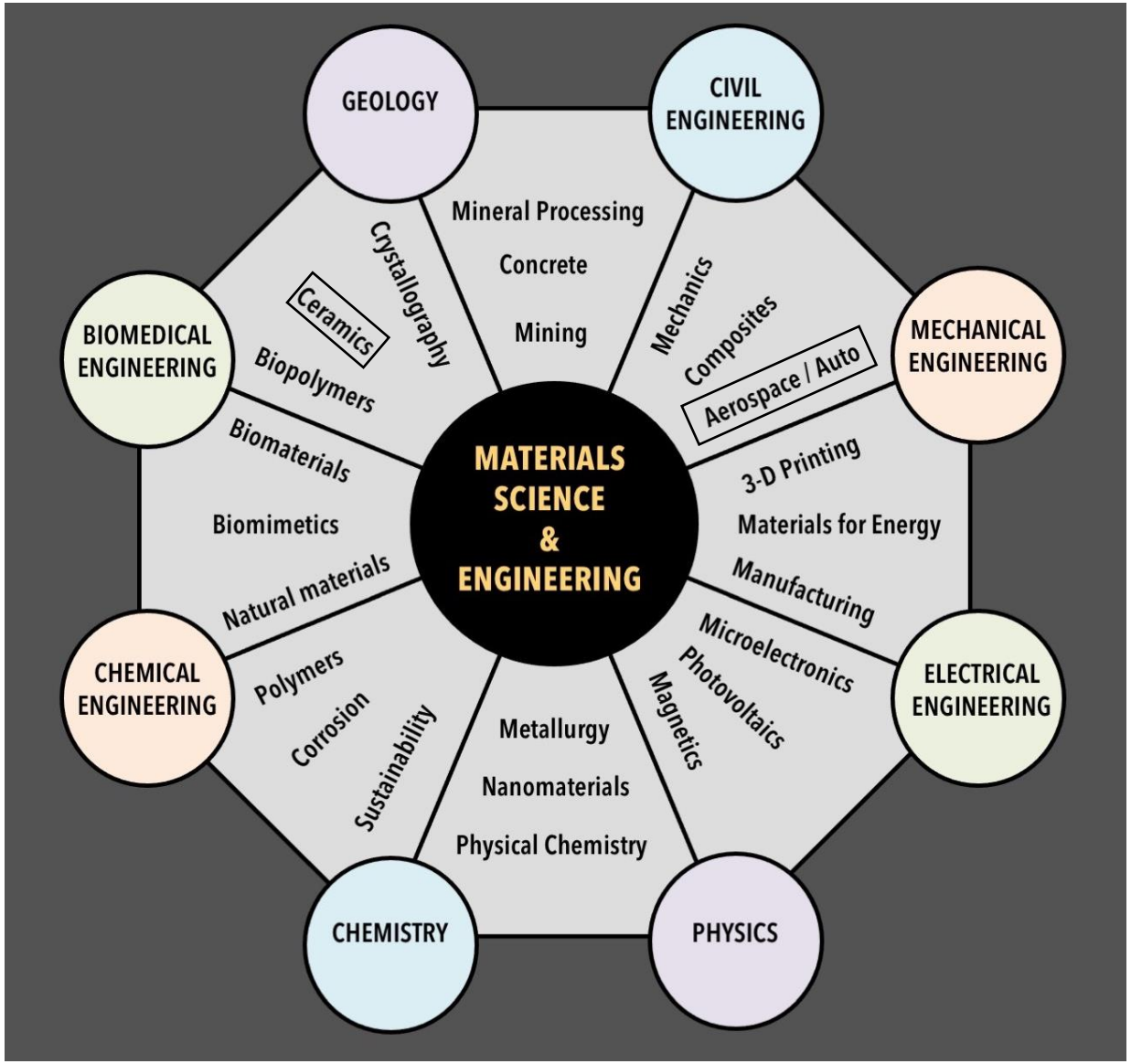
What is Materials Science?

- Interdisciplinary field focused on the discovery, development, and implementation of novel materials to solve real-world challenges (e.g. faster and more fuel-efficient vehicles, better electronics, safer biomedical supplies, etc.)
- It's a rapidly growing field that needs new, motivated scientists to lead the charge in exploring new concepts like machine learning, artificial intelligence, and biomimetic devices

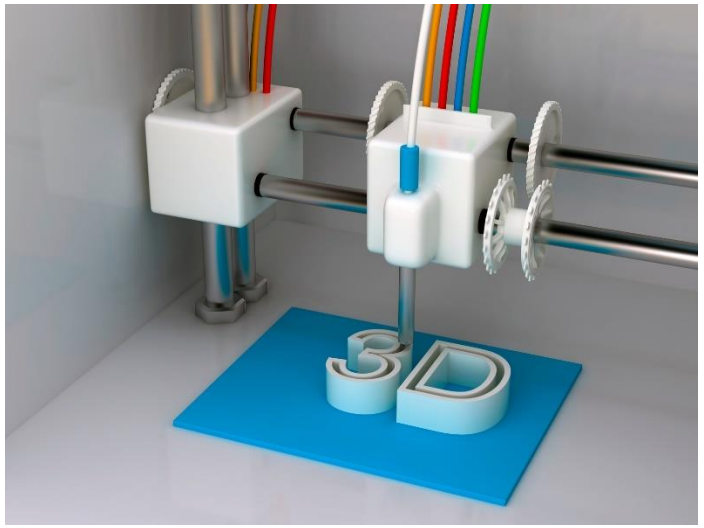


Michigan Technological University

What materials do materials scientists work on?

Metals

Polymers



Ceramics

All three classes of materials have unique characteristics!

www.aremco.com

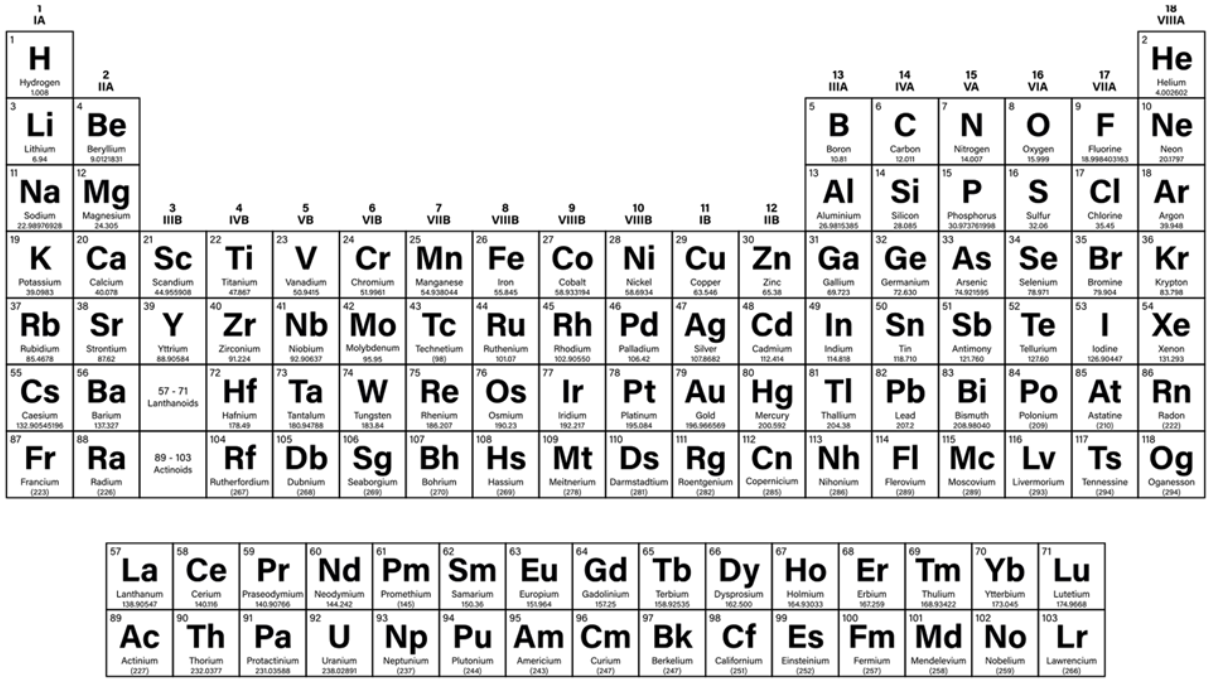
www.thermofisher.com

www.commons.wikimedia.org

Okay what *is* ceramics engineering?

Basic Definition: Ceramic engineering is the practice of creating inorganic, non-metallic materials.

- It's a lot of chemistry!
- It's A little bit a physics
- It's a lot of working with your hands in a lab!
- It involves the study of how particles interact, form, and behave under applied stress and temperature.
- You get to work with a lot of the elements on the periodic table

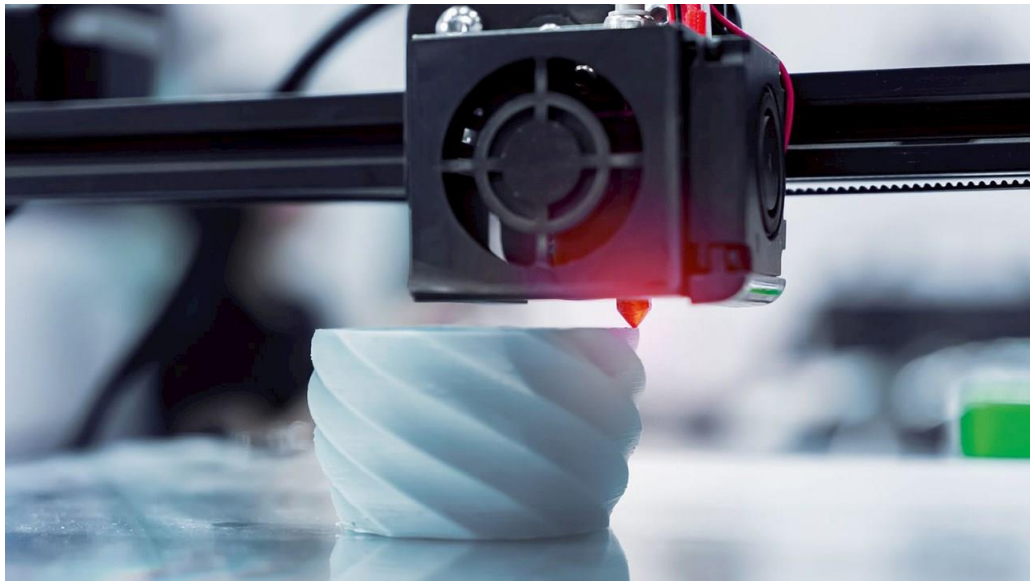


www.precision-ceramics.com

www.theconversation.com

Many opportunities for coding, modeling, and robotics

- The field of ceramics engineering needs more experts on casting, glazing, and additive manufacturing to create novel, complex parts!



Additive manufacturing is the process of printing multiple, stacked layers of material to create finished products with complex geometries. The parts can be used for aerospace, automotive, and industrial applications!

www.gettyimages.com

Are you interested in health care?

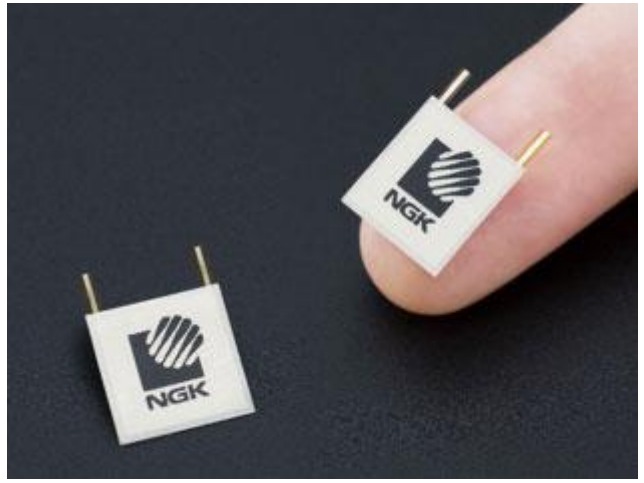
Artificial femur with ball-and-socket joint made of ceramic.

CeramTec is a leading designer and manufacturer of next-generation biomedical devices!

www.industrynewstoday.com

www.youngheaven.us

Are you interested in renewable energy?



Solid-state, ceramic, rechargeable batteries are the future of clean energy and electric vehicles.

www.semiconportal.com

Many solar panels require advanced ceramic materials for operation.

www.youfrancais.com

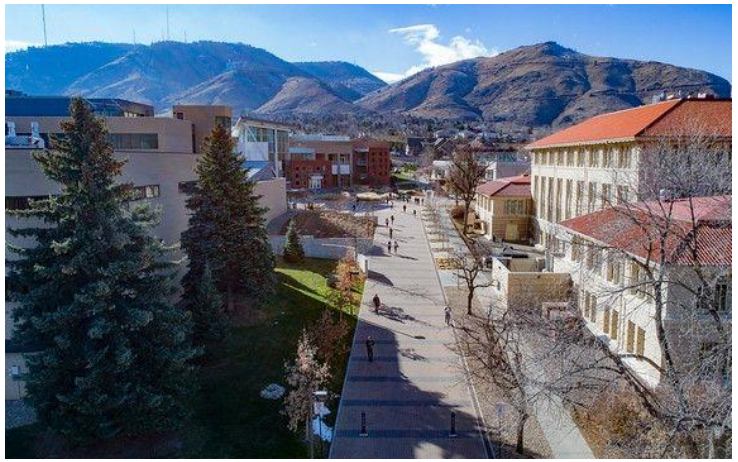
My background

Lansing High School (2010-2014)

- LHS Soccer
- Sporting Kansas City Academy
- National Honor Society Secretary
- Kaw Valley Math Competition

Stay involved!

Colorado School of Mines (2014-2018)



- CSM Men's Varsity Soccer
- Helped found undergraduate research journal
- On-campus lab research job
- On-campus materials science societies/organizations

Stay involved!

University of California, Santa Barbara (2018-2023)

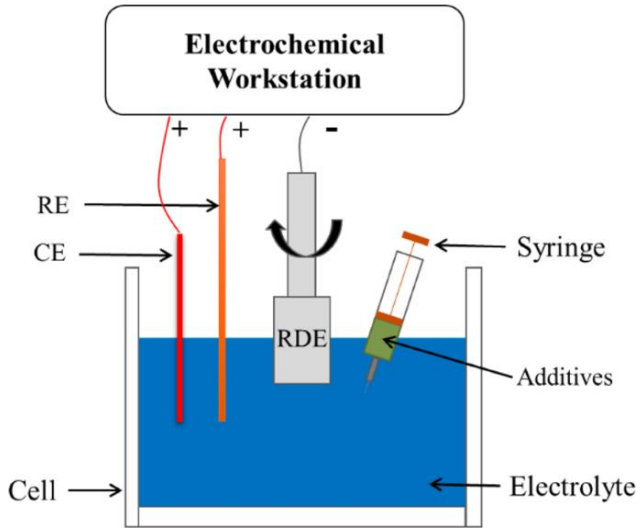
- 3rd-year PhD candidate in the Materials Department
- Involved in the American Ceramic Society (ACerS)

Stay involved!

My internships showed me how diverse Materials Science is

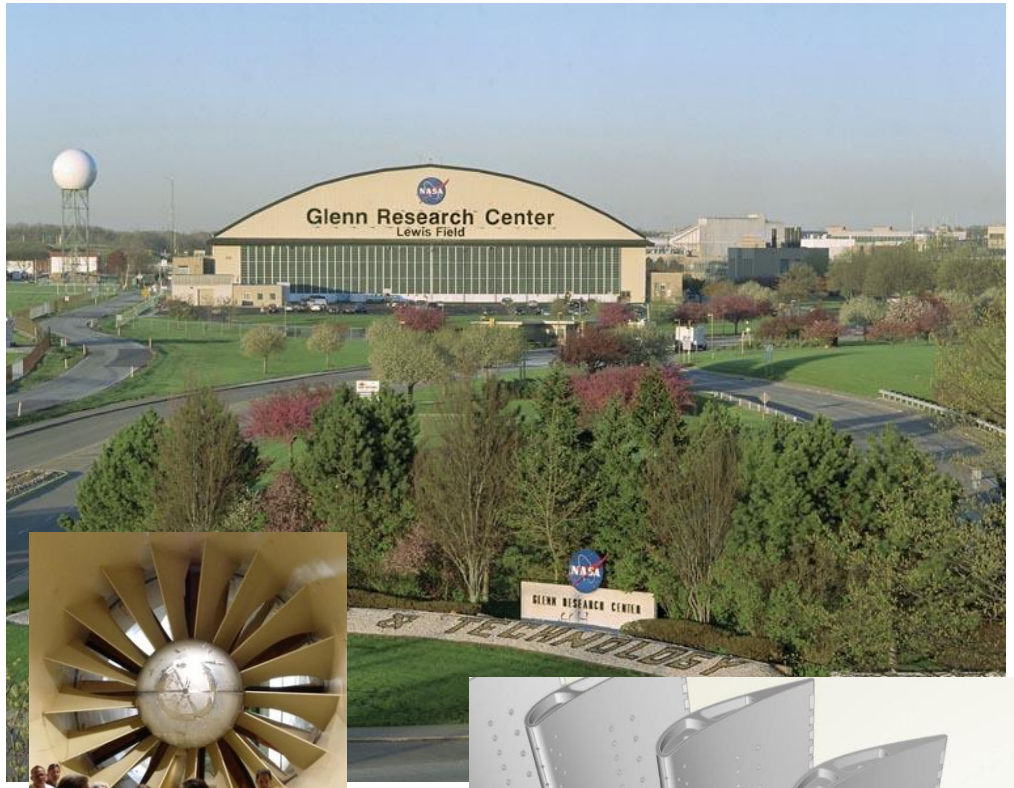
National Institute of Standards and Technology
U.S. Department of Commerce

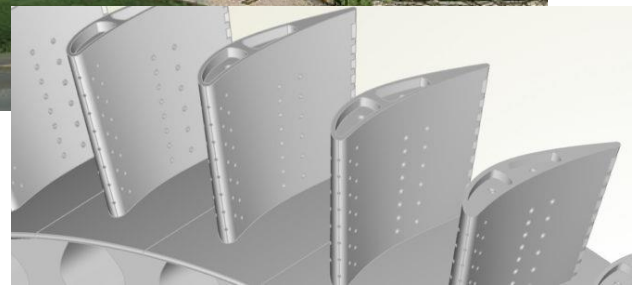
Gaithersburg, MD, Summer2017



www.sciencemag.org

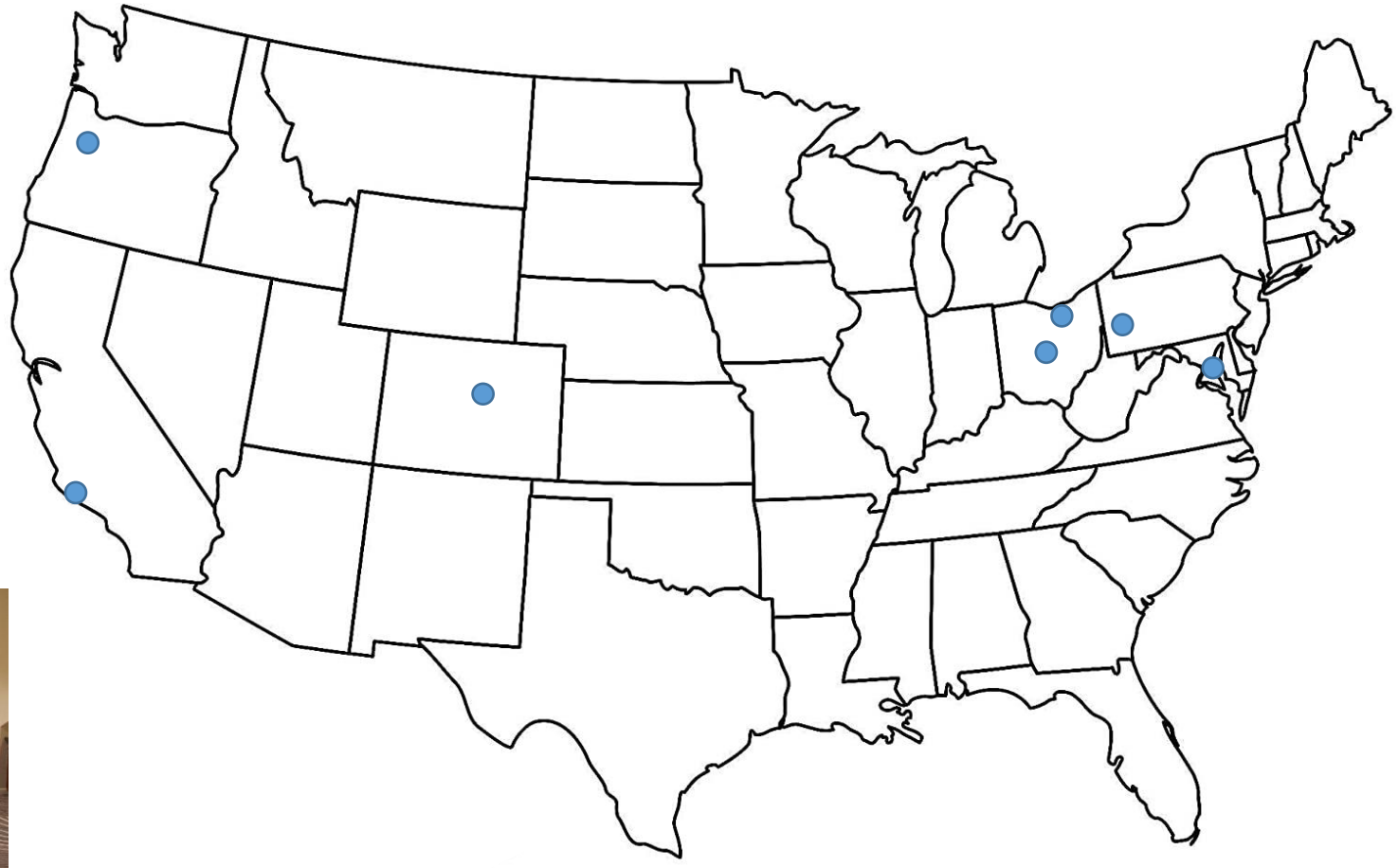
Cleveland Ohio, Summer 2018





nasa.gov

I got to travel too!



- Conferences in OH, PA, OR, etc.
- Internships in OH, MD
- School in CO, CA
- Research presentation in Japan!

President's Council of Student Advisors (PCSA), 2019

You can be compensated well!

Typical salaries:

- Summer internships (with room-and-board covered) $13-25/h
- Engineer with B.S. degree: $50K-90K/y
- Engineer with M.S. degree $80K-110K+/y
- Assistant professor: ~$100K+/y
- Tenured professor $150-400K+/y
- Project manager or company leader: $200K-400K+/y
- Senior research scientist at a national lab: $100K-400K+/y

Other benefits:

- Travel! Engineering is a great way to see the world.
- Collaboration! A great way to meet new people at conferences.
- Personal growth! Fields are rapidly developing, requiring hardworking and dedicated scientists.

Why are materials scientists and engineers in such high demand?

- Most of the world's big problems require materials science to solve
- There are more jobs than employees available for hire

Power and Energy

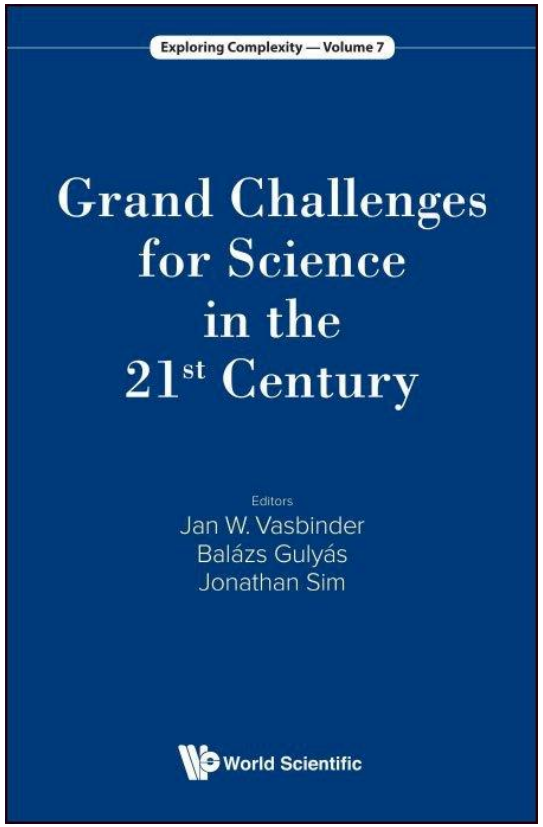
Robotics

Space Exploration

Biomedical devices

Artificial Intelligence

The list goes on!



Find a similar resource and see what interests you!

General tips for college (even if you don't go into Materials Science)

- Live in a freshman dorm your freshman year
  - Everyone will be looking to make friends! Much harder to make friends off campus.
- Do all of the orientation activities!
  - Events like these are a great way to meet people you'd otherwise never see.
- Join club organizations and societies, and give back to your community
  - This is a great way to give back while at the same time meeting like-minded people.
- You might regret the things you didn't do
  - You never know who you might meet when you put yourself out there.
- Find a mentor
  - Having a support system is critical to enjoying your time at school and navigating the challenges that will come your way.
- Most importantly, work hard and **have fun!**

Slide credit: Shannon Rogers (Colorado School of Mines)