Use cryo-EM to understand and design macromolecular assemblies

#cryo-EM #cancer biology #anaerobic microbes #structural proteomics

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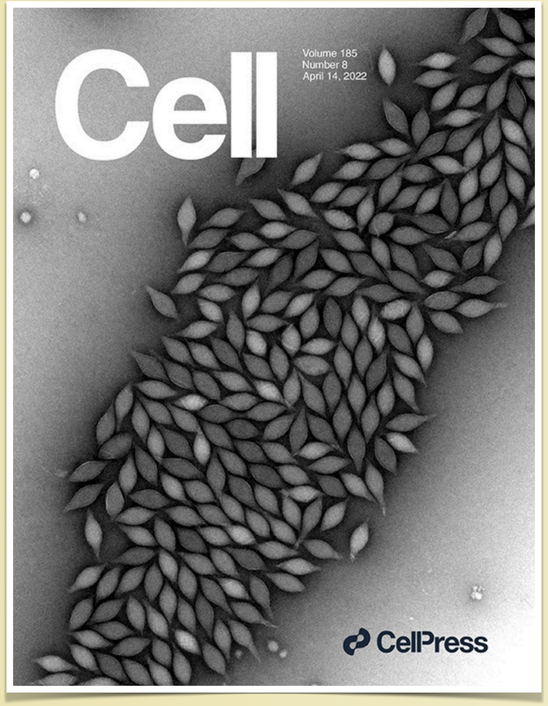
Contact Jerry to do a rotation!



Publication list (2017-2022)

- 2022, Cell
- 2022, JACS
- 2022, Nat Microbiol
- 2022, Nat Microbiol
- 2022, PNAS
- 2022, Nat Comm
- 2022, Nat Comm
- 2022, Chem Reviews
- 2022, PNAS
- 2022, JCP
- 2022, BPJ
- 2021, Matter
- 2021, Nat Comm
- 2021, JoV
- 2021, Soft Matter
- 2020, PNAS
- 2020, Cell Reports
- 2020, PNAS
- 2020, Nat Comm
- 2020, PNAS
- 2020, ACS Nano
- 2020, Adv in Virus Res
- 2020, Virus Evolution
- 2019, PNAS
- 2019, Nat Microbiol
- 2019, PNAS
- 2019, Cell
- 2018, Nat Comm
- 2018, eLife
- 2017, Nat Comm
- 2017, Nat Comm
- 2017, Structure
- 2017, Structure

#Why cryo-EM?

- The power of directly **SEEING** your macromolecule
- The **DOMINANT** method of structure determination for macromolecular assemblies
- Capture macromolecule **DYNAMICS**
- Proteins can be **DIRECTLY IDENTIFIED** from an impure, low concentration prep

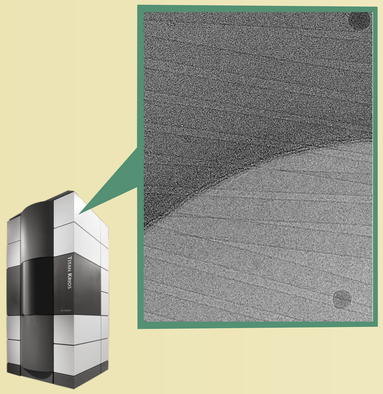
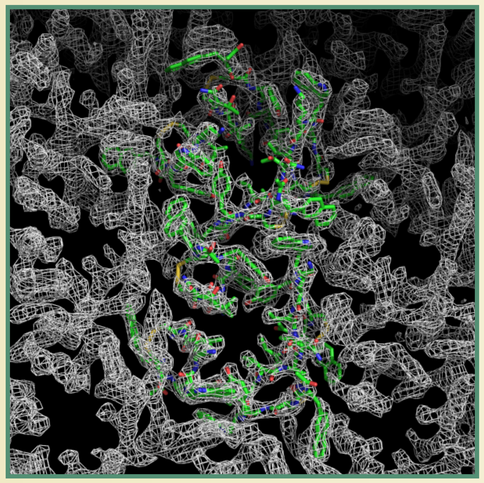


Image processing (a few days)

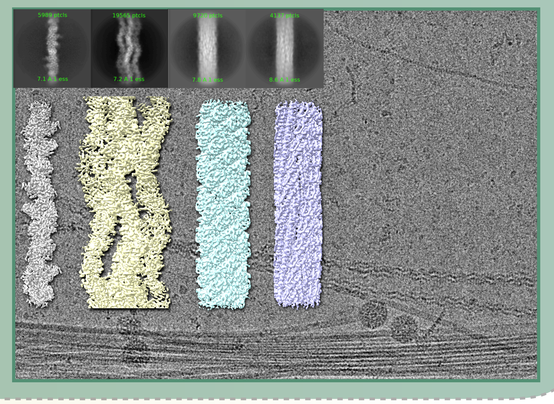
Lanreotide
FDA approved anti-tumor peptide



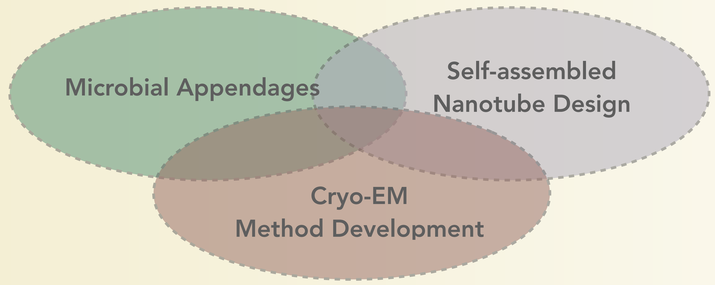
"My name is Titan Krios" - Titan Krios

#Project 1: How do microbes make long-range electron transfer happen?

- We are the **FIRST** group that solved the first three atomic structures of Geobacter conductive nanowires at near-atomic resolution (Cell 2019, Nat Micro 2022, eLife under review)
- This is a novel family of cell appendages made of **CYTOCHROMES**
- Is this all? Geobacter is really that unique? From aquatic sediments to the human **GUT-MICROBIOME**, respiring anaerobic microbes naturally transfer electrons on the micron-scale.
- **UNPUBLISHED** datasets collected to work on



PROJECTS IMMEDIATELY AVAILABLE

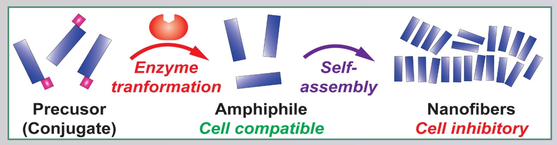


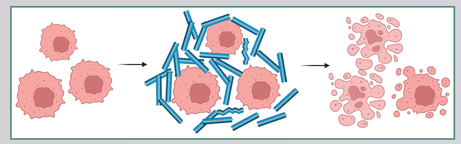
#What can this lab provide for your next career stage?

- Core approach: cryo-EM, helical indexing, structural proteomics
- Optional skills: cancer biology, anaerobic biology, peptide chemistry, Python programing, molecular biology
- Networking: conference presentation, departmental platform talks, collaborative projects outside and within UAB
- A customized development/training plan tailored for your career trajectory

#Project 2: Nanotube design in new frontiers in ANTI-TUMOR nano-medicine

- Engineer small peptides to selectively **KILL CANCER CELLS**
- **STRUCTURE-BASED EDITING** of existing FDA approved anti-tumor drugs
- **COLLABORATIVE** projects within and outside UAB
- Several ongoing projects available

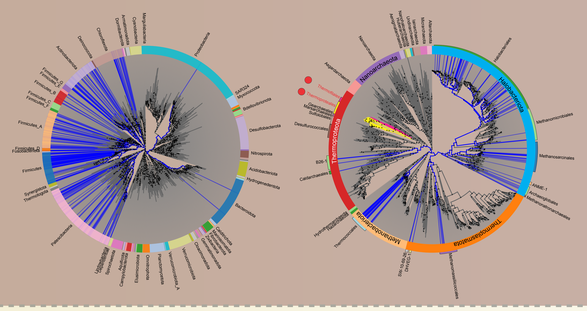


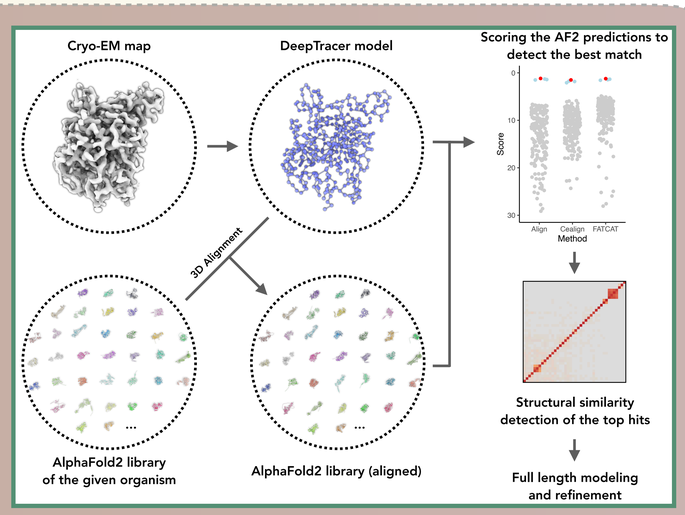


EISA (Enzyme-instructed self-assembly)

#Project 3: Cryo-EM methods development

- Protein **IDENTIFICATION** (directly from EM maps)
- **HELICAL** indexing
- Structure **CLUSTERING**





Affiliations and Funding

NIH National Institutes of Health

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM