Joint School of Nanoscience and Nanoengineering
Greensboro, North Carolina, USA, 27401

The University of North Carolina at Greensboro
1400 Spring Garden St., Greensboro, NC, 27412

Exploring Bio-inspired Polysaccharide for Future Multifunctional Metamaterial Applications in Aerospace and Green Technologies

[1]*Maurelio Cabo Jr.*, [1,2]Samir Kattel, [1]Besan Khader, [2]Nitin More, [2]Rutujaa Kulkarni, [2]Ram Mohan, [2]Jeffrey Alston, [1]Eric Laws, [1]Dennis Lajeunesse
Joint School of Nanoscience and Nanoengineering, [2]North Carolina A&T State University, [1]The University of North Carolina at Greensboro

Global Plastic Pollution:

The Numbers Are Not Lying

2.5 BILLION

METRIC TONS OF SOLID WASTE IS PRODUCED ALL AROUND THE WORLD

8 MILLION

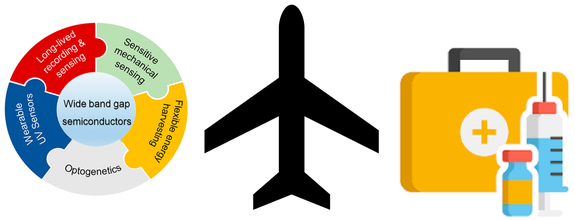
AND EVERY YEAR

METRIC TONS OF PLASTIC GOES INTO THE OCEAN

Source: U.S. Department of State I Plastic Pollution: Office of Environmental Quality (2023)

Why this research significant?

- Global semiconductor industry **sales totaled $526.8 billion** in 2023
- A demand to increase the aerospace **engine performance up to 50%**
- Reduce the **6 million metric tons** of plastic generates by the US healthcare sectors

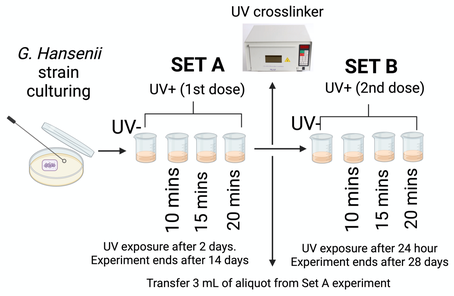


Future Works:

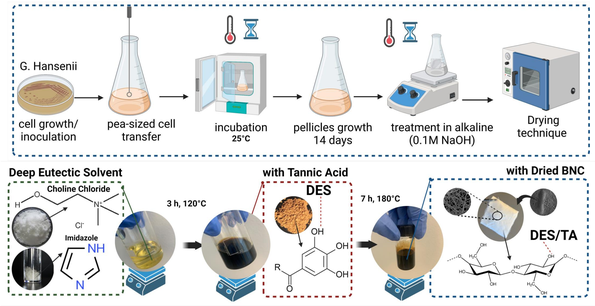
- Sensing application to detect heavy metal (Pb, Ni, Ar) and forever chemicals (PFAS and GenX); Coating flexible substrates for wearable sensors; Lightweight Nanocomposite w/ built-in energy storage.

METHODS:

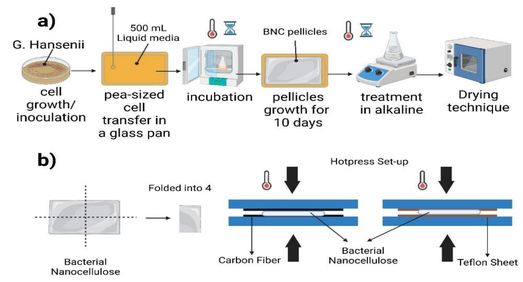
Mutagenesis of Bacterial Cells



Solubilizing Bacterial Nanocellulose

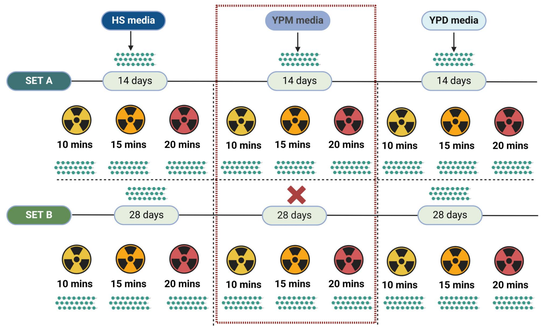


Self-Bonding Mechanism

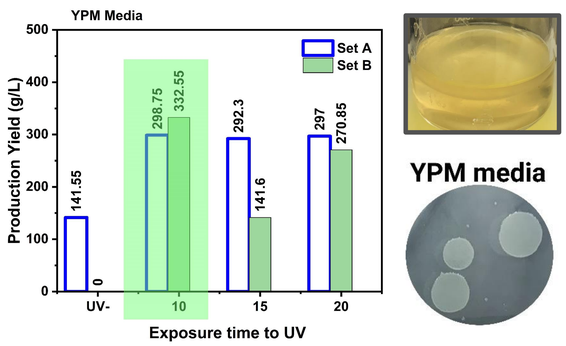


RESULTS:

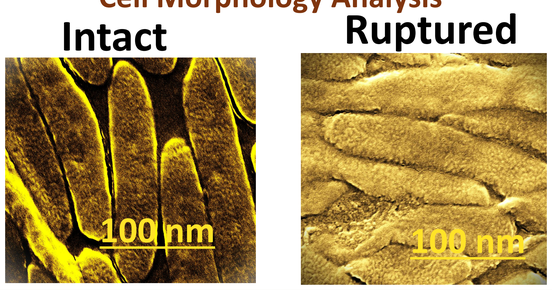
Bacterial Nanocellulose Hydrogel Growth



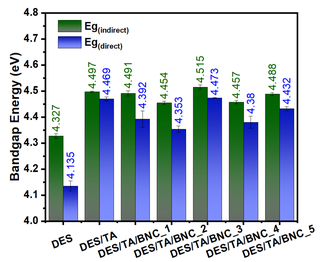
Measuring Production Yield



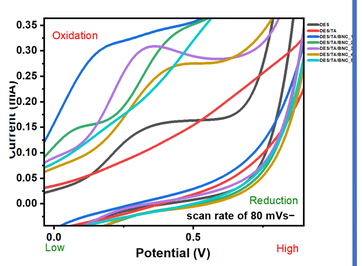
Cell Morphology Analysis



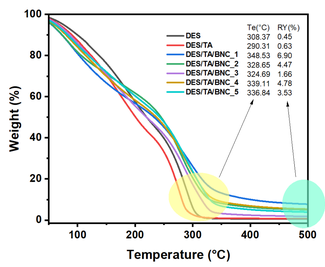
Wider Bandgap



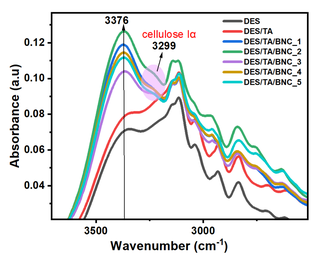
Electron Mobility



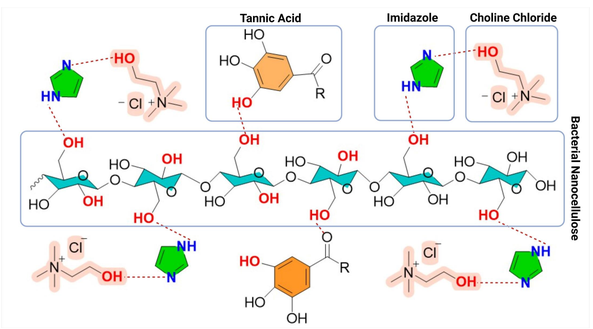
Thermal Stability



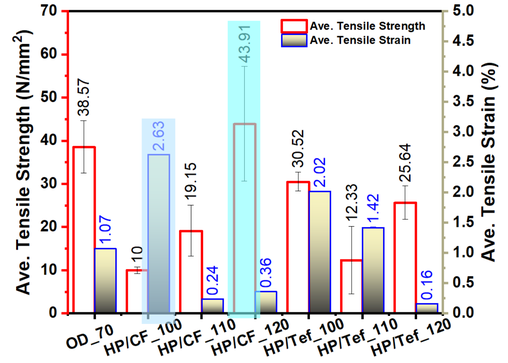
Hydrogen Bonding



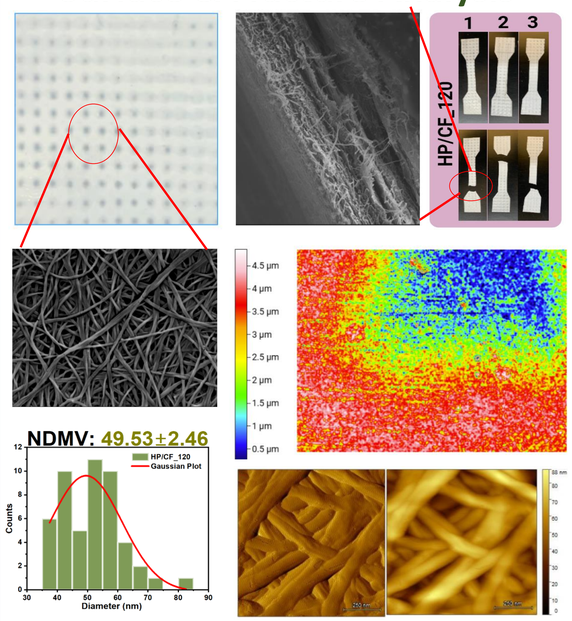
Proposed Intermolecular Interaction



Tensile Strength Test



Surface & Fracture Analysis



Let's connect:

Email: mccabo@uncg.edu / drlajeun@uncg.edu
Contact #: 336-210-8245

Acknowledgment:

Genomics