Portable Electrospinning Device
Seawater Nanocoating Experiments

Jake Holmberg | Satyam Patel | Camryn Russell

North Penn High School Engineering Academy Lansdale, Pennsylvania USA

Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Portable Electrospinning Device: Initial Problem, Initial Research

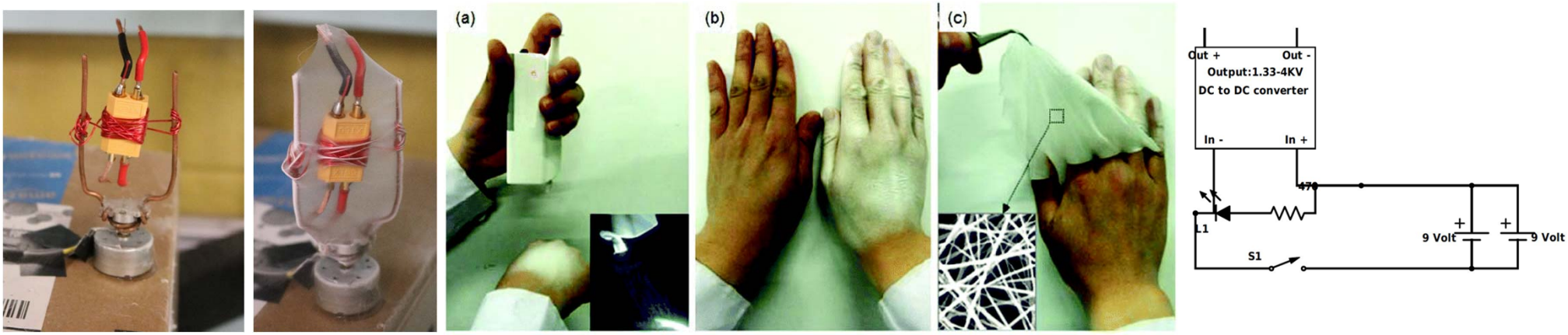
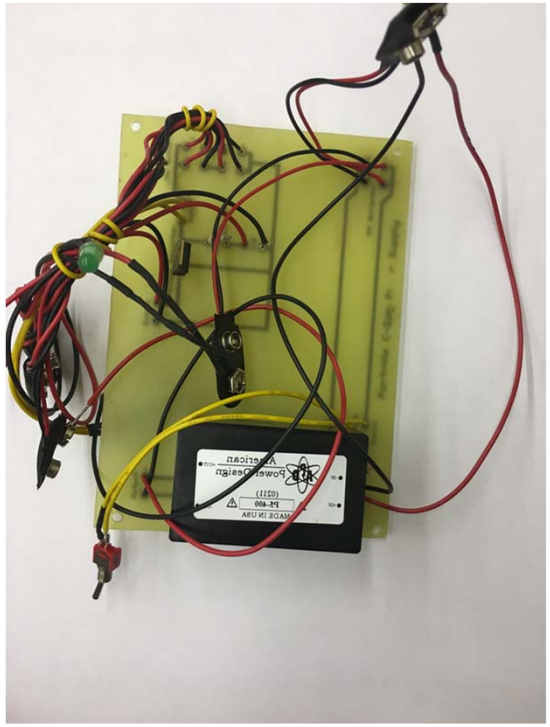


Image credit:
Qingdao University, Nanoscale: Royal Society of Chemistry
http://pubs.rsc.org/en/content/articlelanding/2015/nr/c5nr02922h#!divAbstract

Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Initial Prototype-Failure @4KV



Nanofiber-Based Circuit Protection Materials and Methods

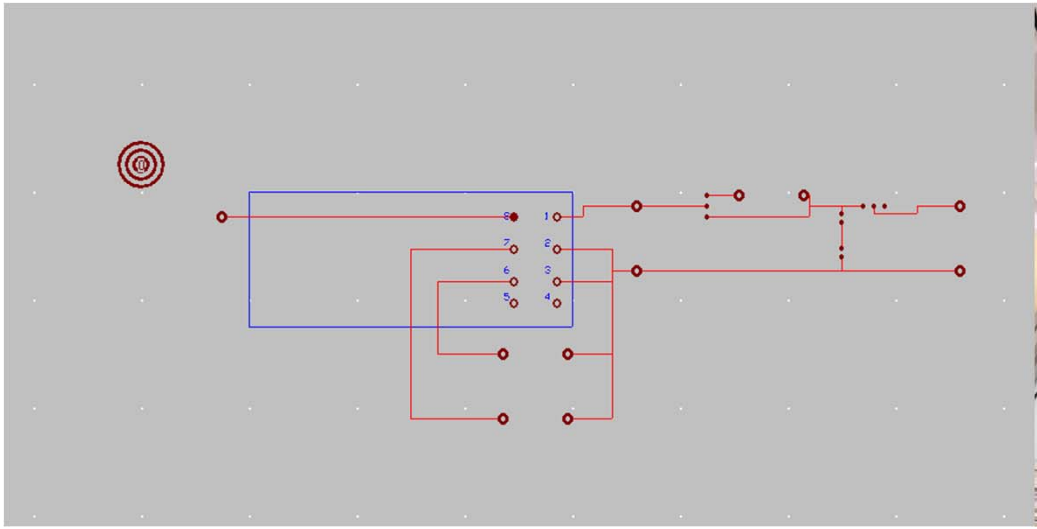
North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

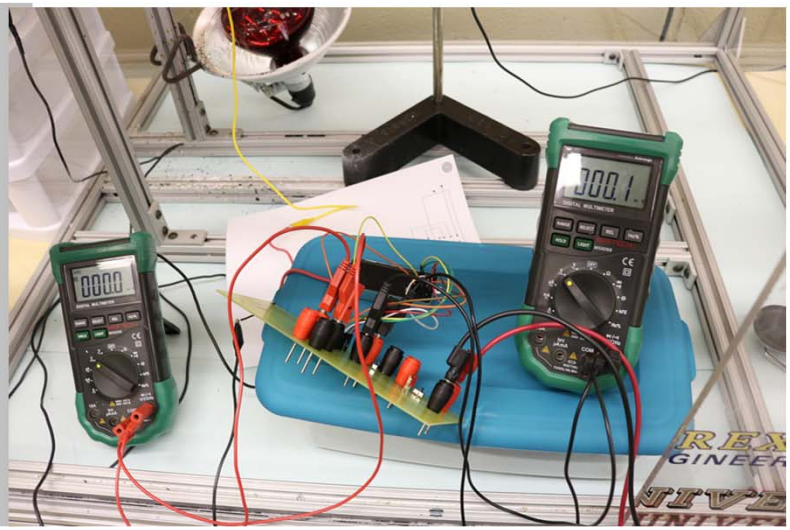
DC-DC 10KV Converter

Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Prototype Two: 10KV

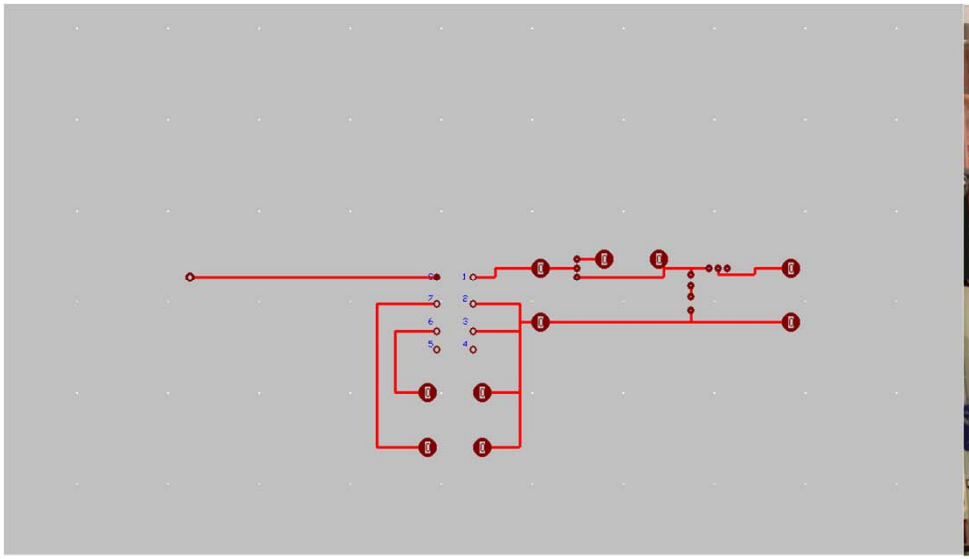


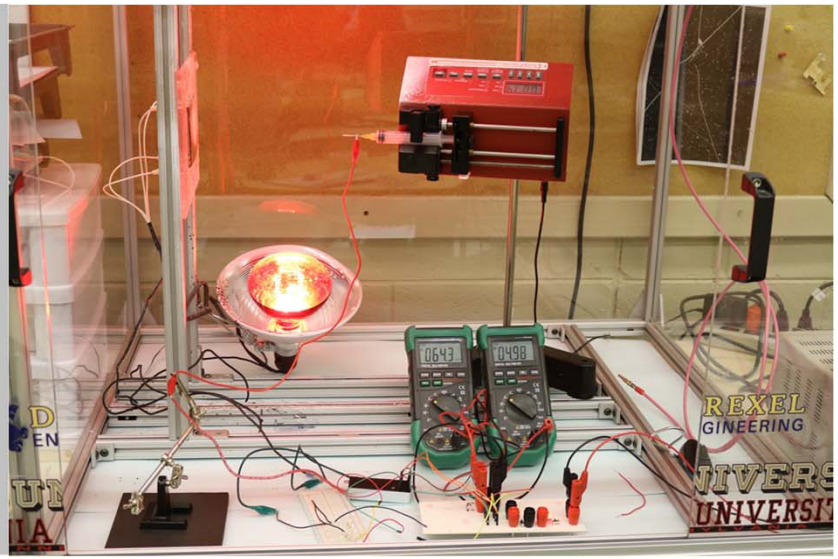


Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Prototype Three: Success!

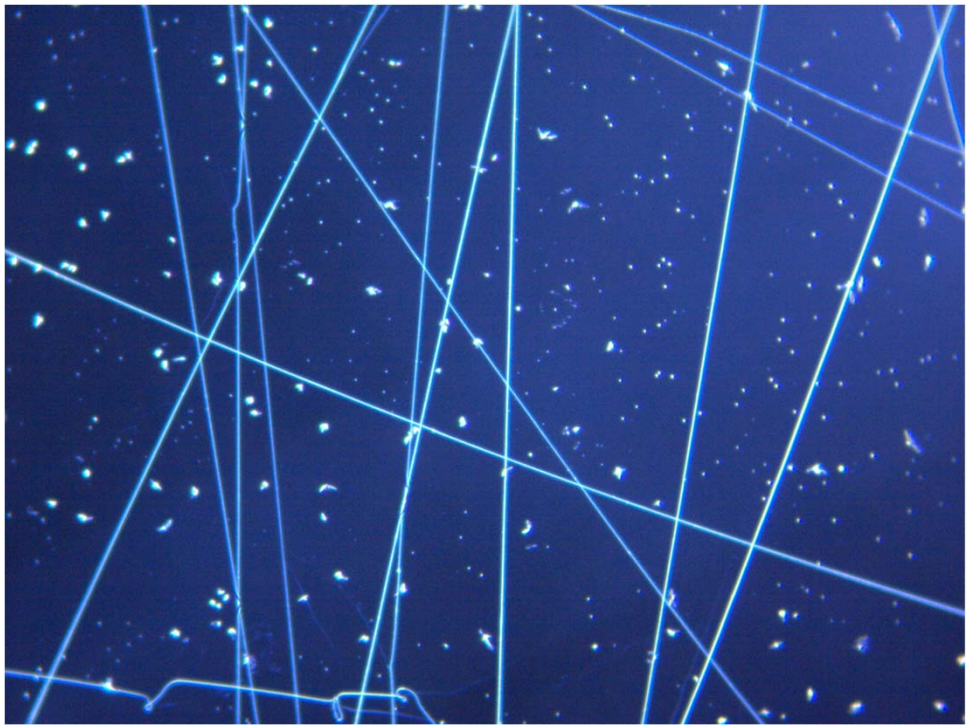




Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Results of Portable Electrospinner Power Supply



Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Future Work

- Syringe Pump
- Power input
- Evaluating the effectiveness and practicality of portable electrospinning device

Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Problem Statements

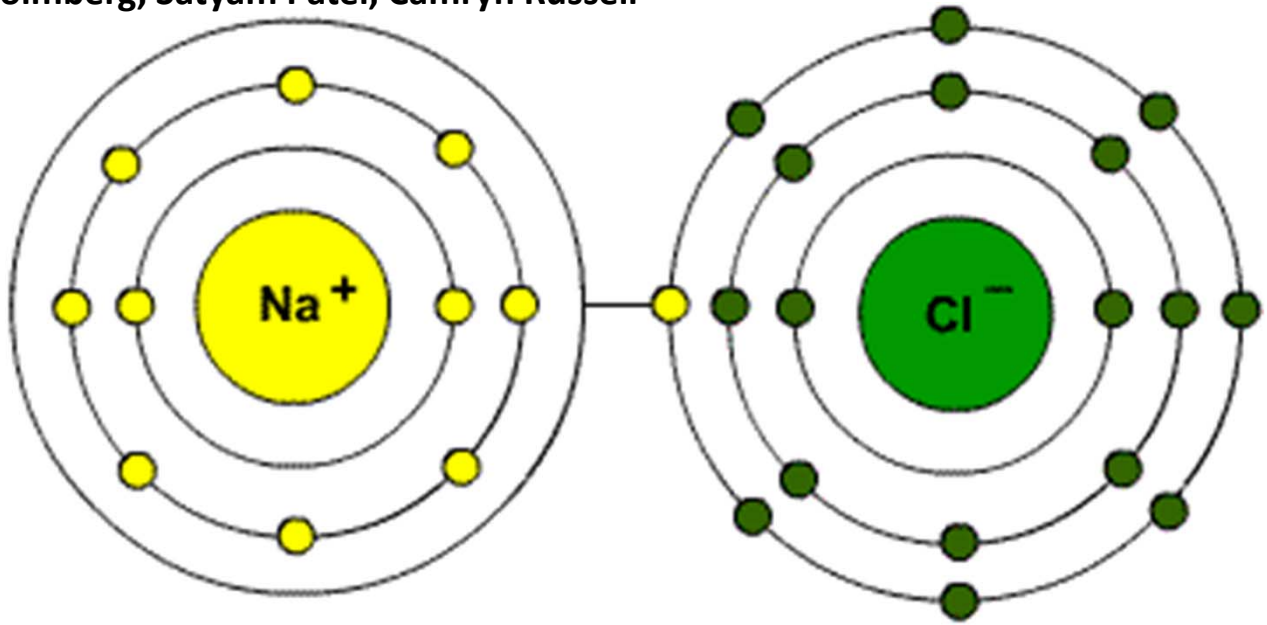
Problem Statement #1:
Electrical connectors are difficult to protect from water infiltration.

Problem Statement #2:
Nanofibers are difficult to apply to electrical connectors

Research Statement:
Polymer choice is the critical factor in determining the effective material to protect electrical connectors.

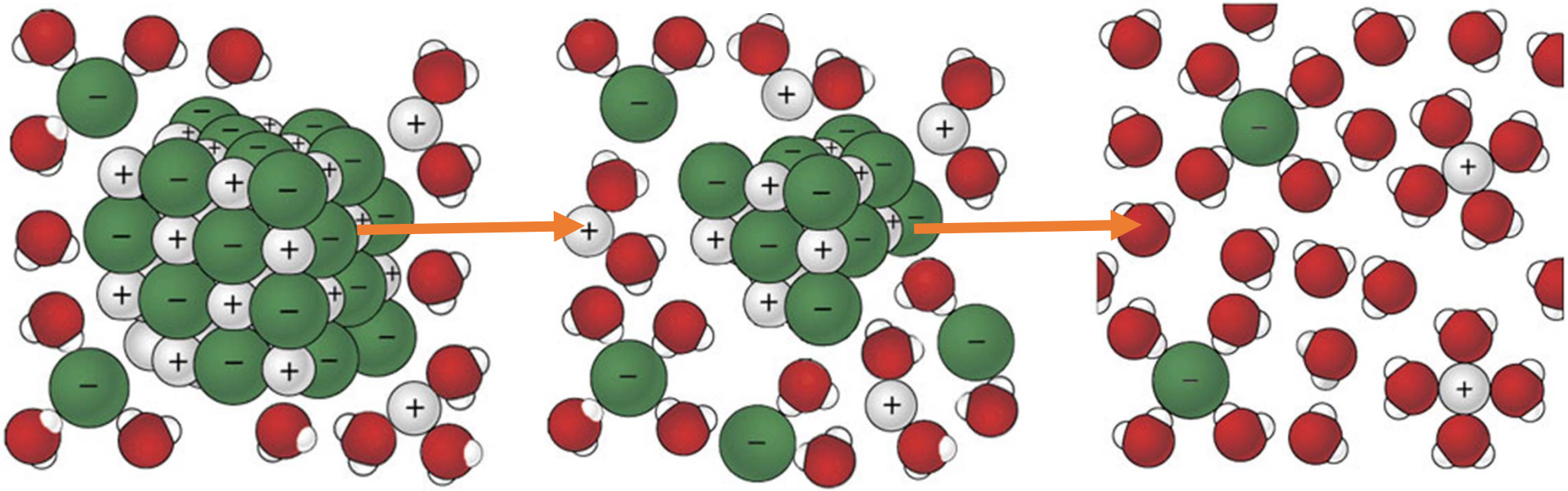
Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell



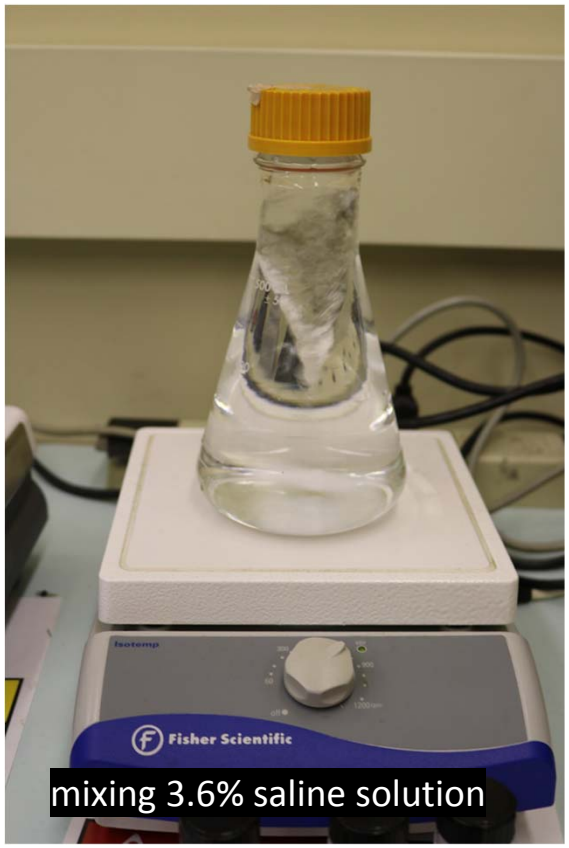
Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell



Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell



mixing 3.6% saline solution

Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Types of Coatings Tested

Acrylic:

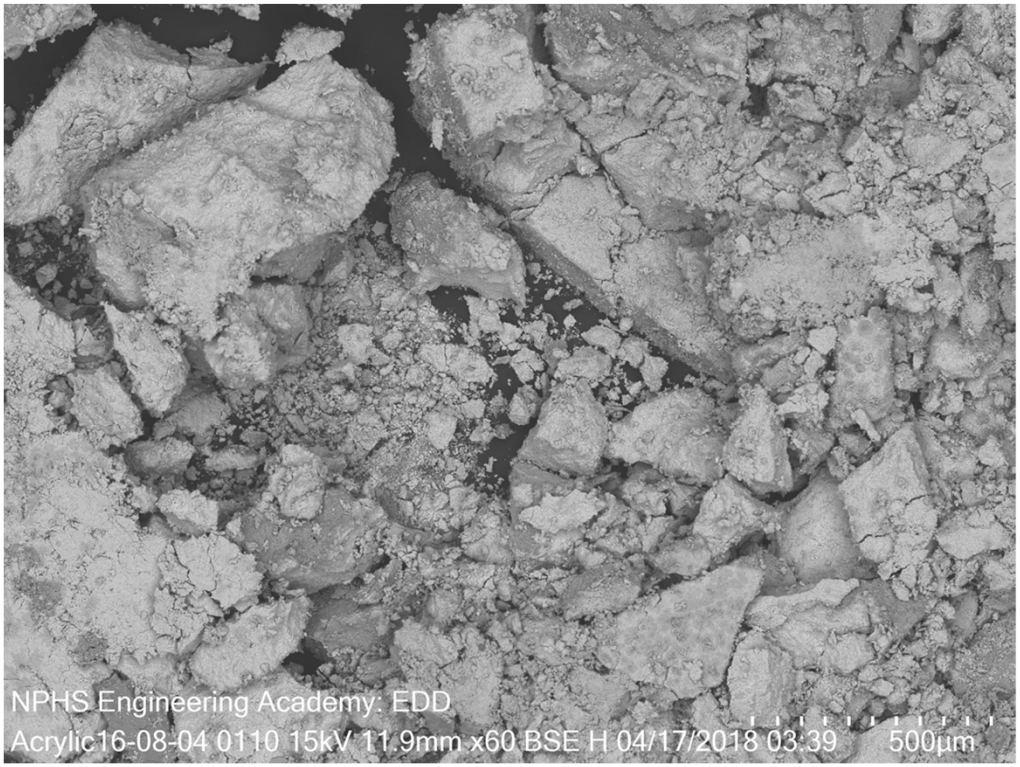
Urethane:

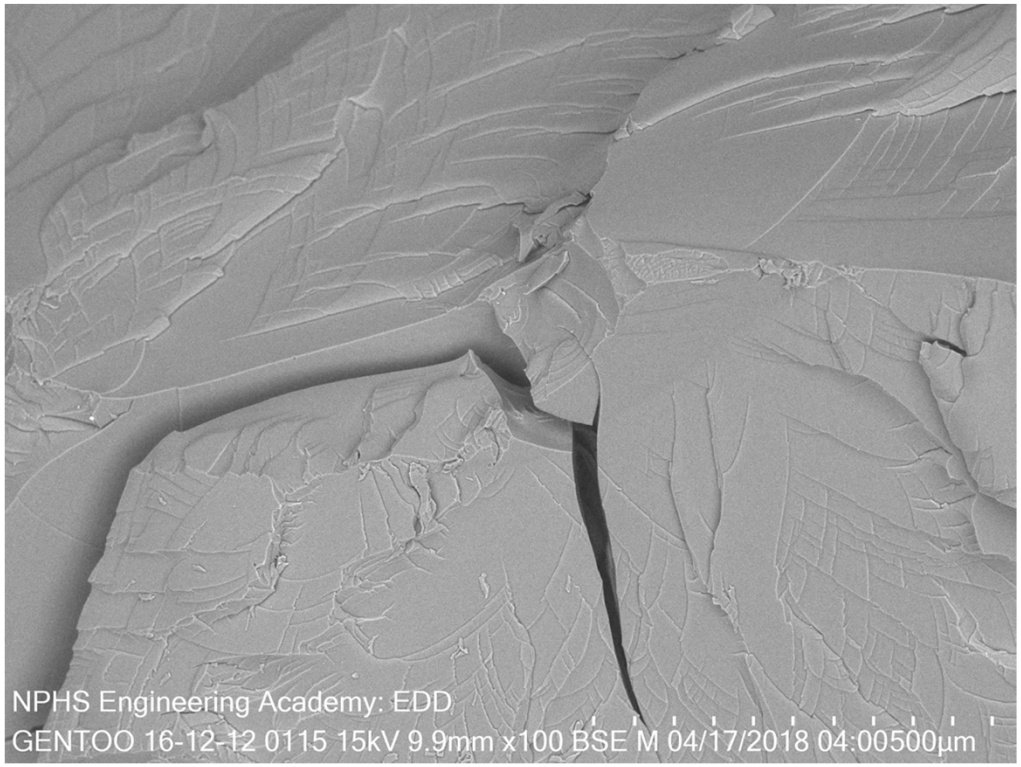
Gentoo:

Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Properties of coatings visualized (Picture credit: Mr. Boyer)

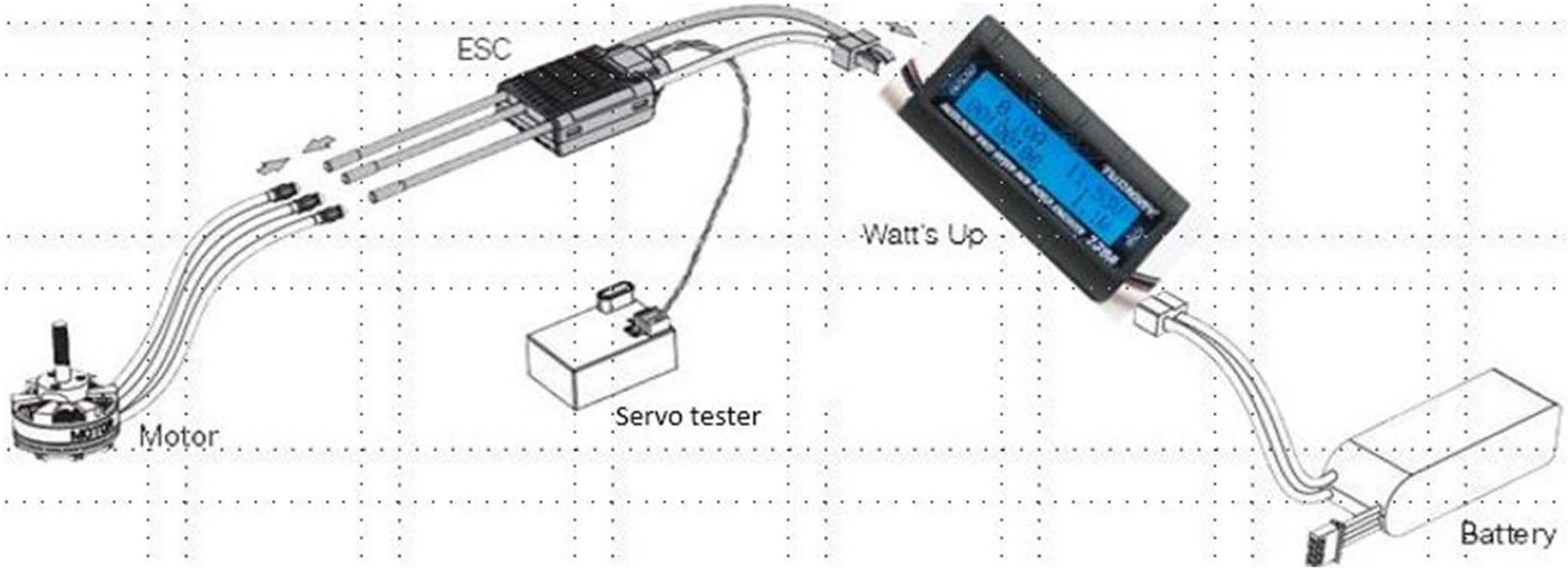




Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

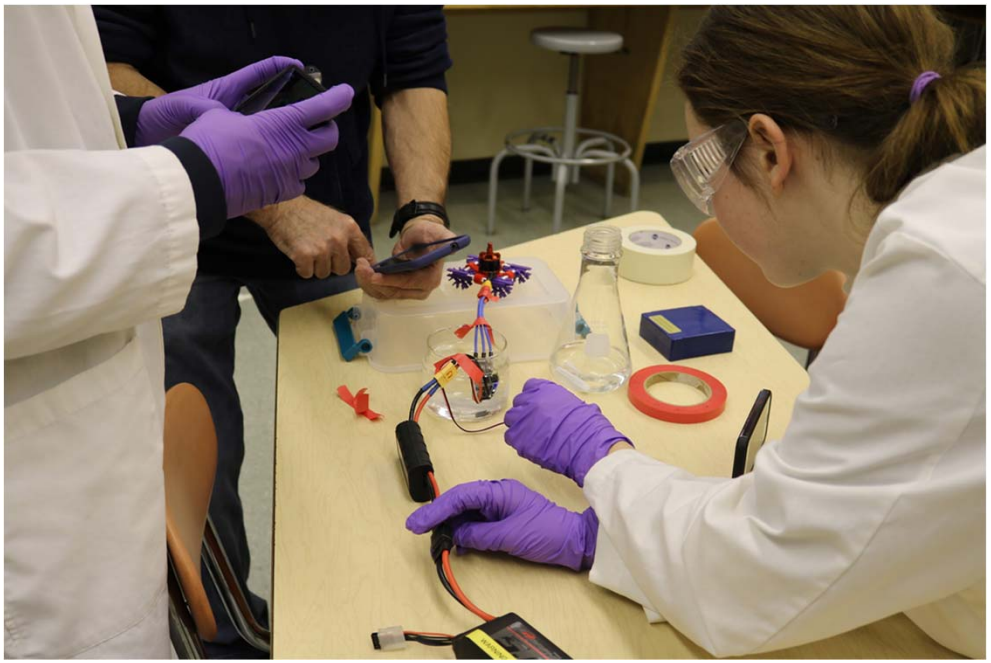
ESC Test Assembly

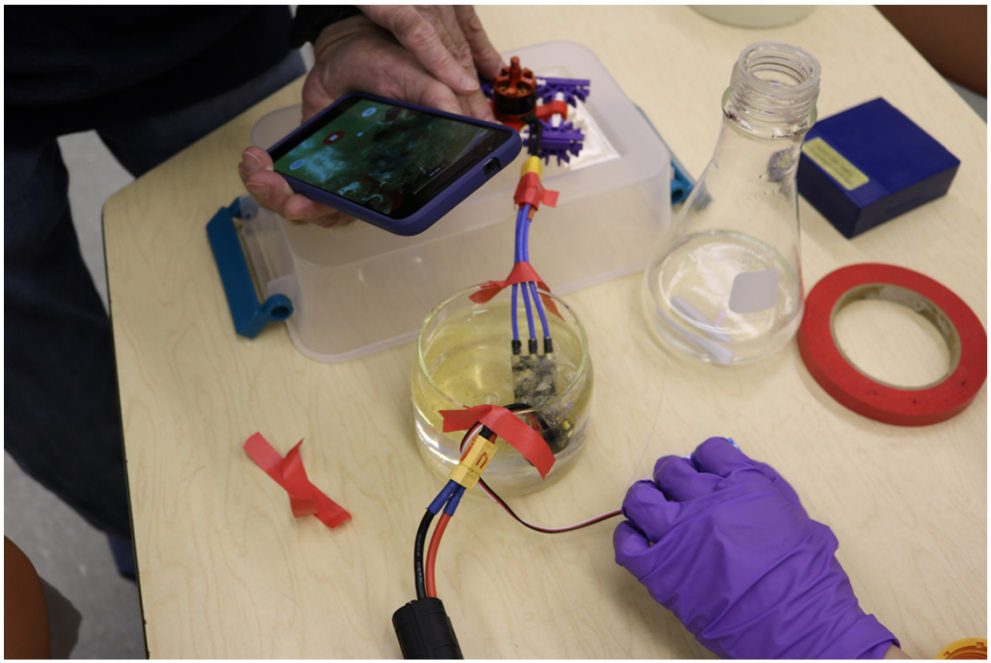


Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

ESC Test Assembly





Nanofiber-Based Circuit Protection Materials and Methods

North Penn NASA Research Team:
Jake Holmberg, Satyam Patel, Camryn Russell

Thanks for Coming