



Dye-Sensitized ZnO fibers from Electro-spinning and Photovoltaic Cells

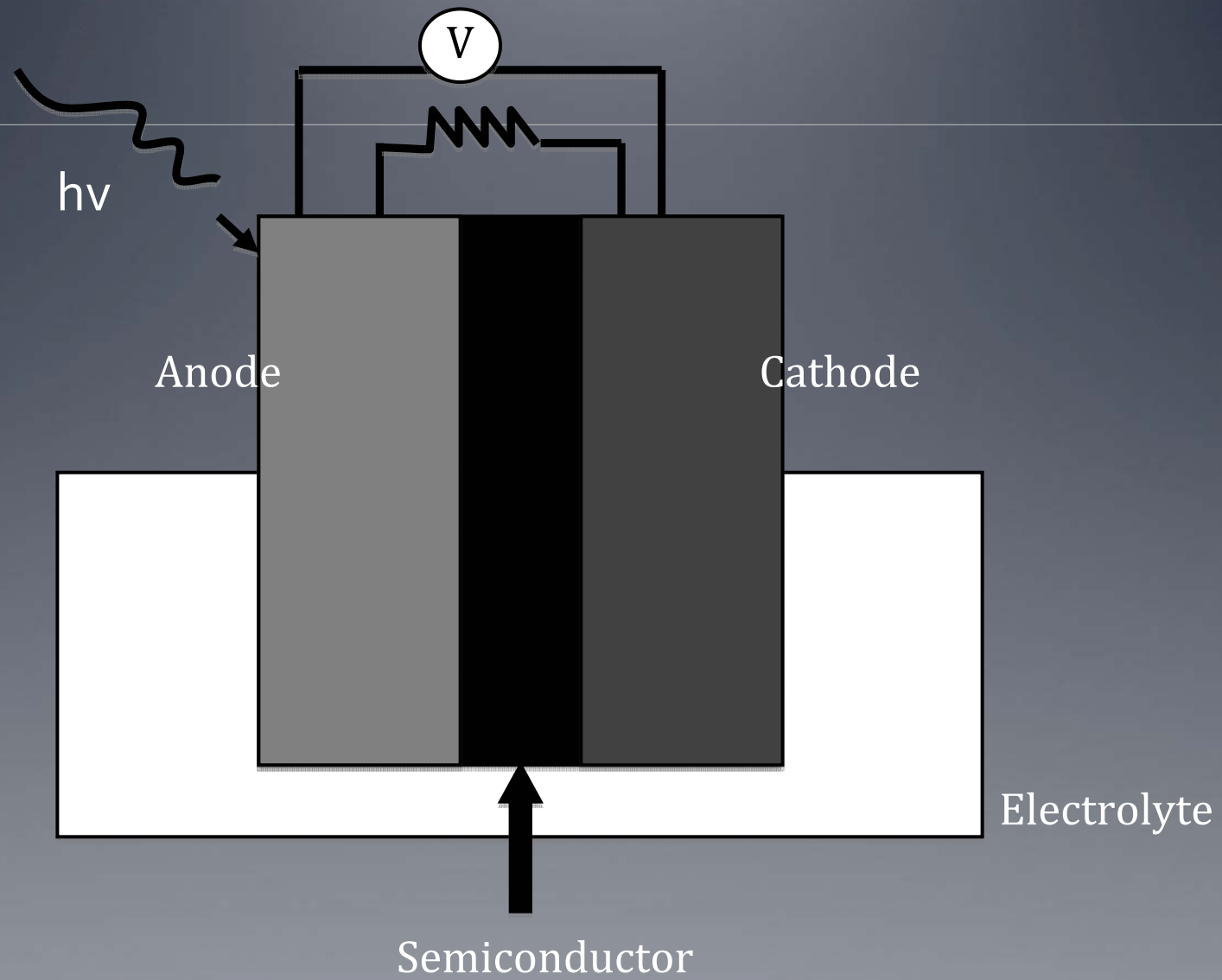
Ramon Luis Figueroa-Diaz
University of Puerto Rico at Cayey
Dr. Jorge Santiago-Aviles
University of Pennsylvania

Outline

- Introduction and Background
 - Goal
 - Experimental Setup
 - Results
 - Discussions and Conclusions
 - Future Work
 - Acknowledgments
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Introduction and Background

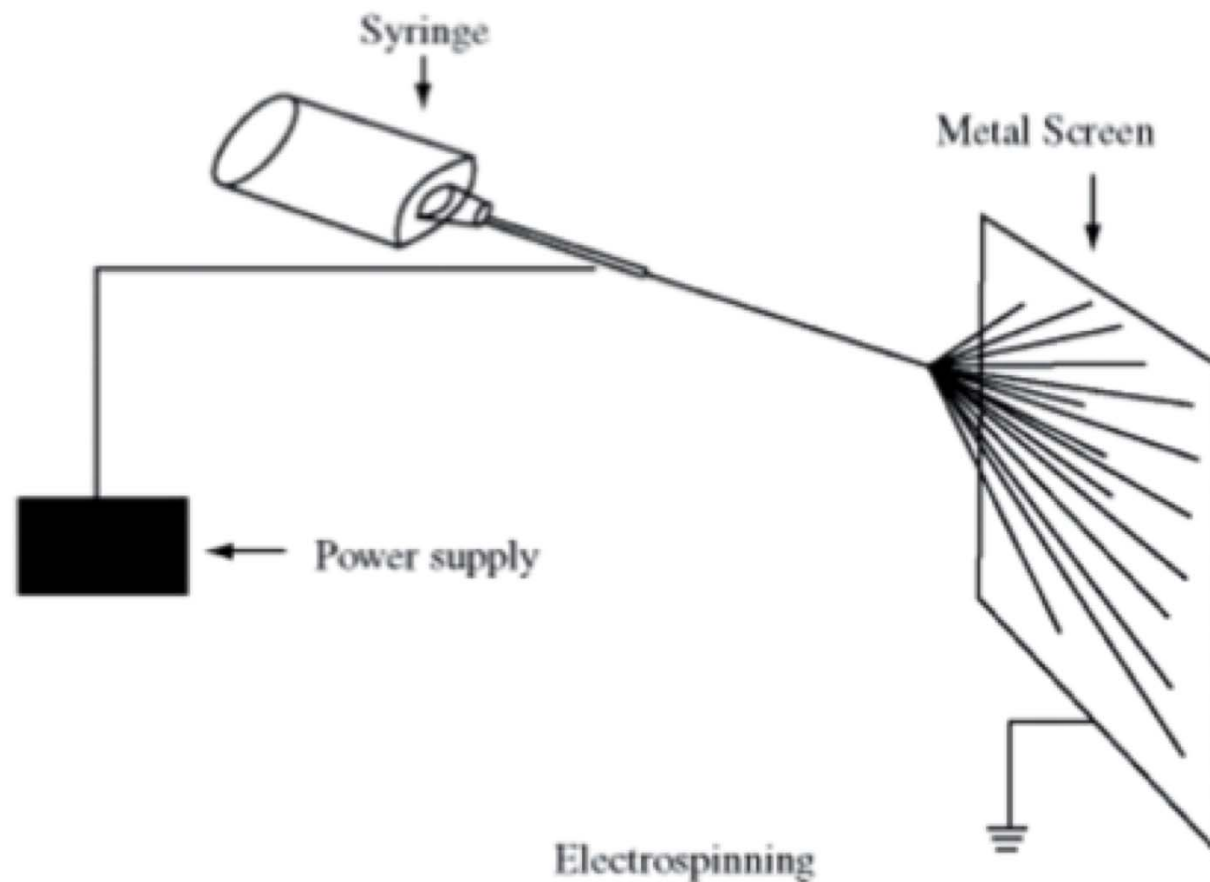
- Dye-Sensitized Solar Cells (DSC)
 - Low-Cost Solar Cells based on a photoelectrochemical system.
 - Photo-electrochemical System
 - Is a system based on a semiconductor between a photosensitized anode and a cathode, both immerse in an electrolyte.
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Semiconductor

- Zinc Oxide
 - ZnO nanostructures exhibit interesting properties including high catalytic efficiency and strong adsorption ability.
 - ZnO can be synthesized using the electrospinning technique.
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Electrospinning Technique



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Goal

- The main goal of this research is to develop a methodology to produce zinc oxide fibers from the electrospinning technique.
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Experimental Setup

- Prepare a solution 33% wt/wt of Zinc Acetate in water.
 - Add a solution 20% wt/wt of Poly(vinyl alcohol) in water.
 - Heat at 80°C and stir overnight.
 - Use the electrospinning technique.
 - Heat the fibers at 650°C for 6 hours.
 - Characterize the fibers.
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Preliminary results

- After performing the electrospinning technique, we did not obtained fibers.

What happened?

- For the voltage that can be used in our setup, the solvent were not able to vaporize through the procedure.
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Changes

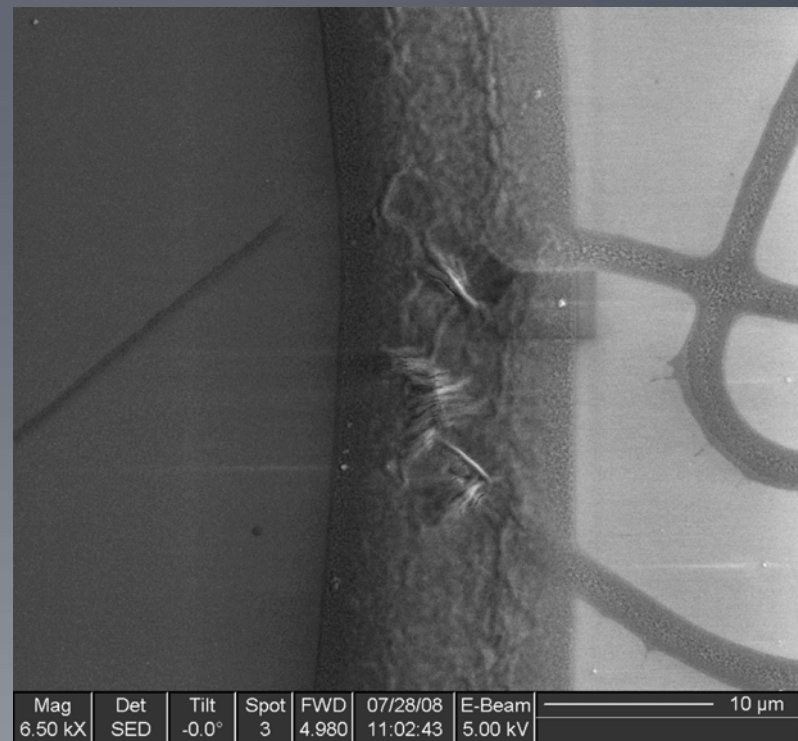
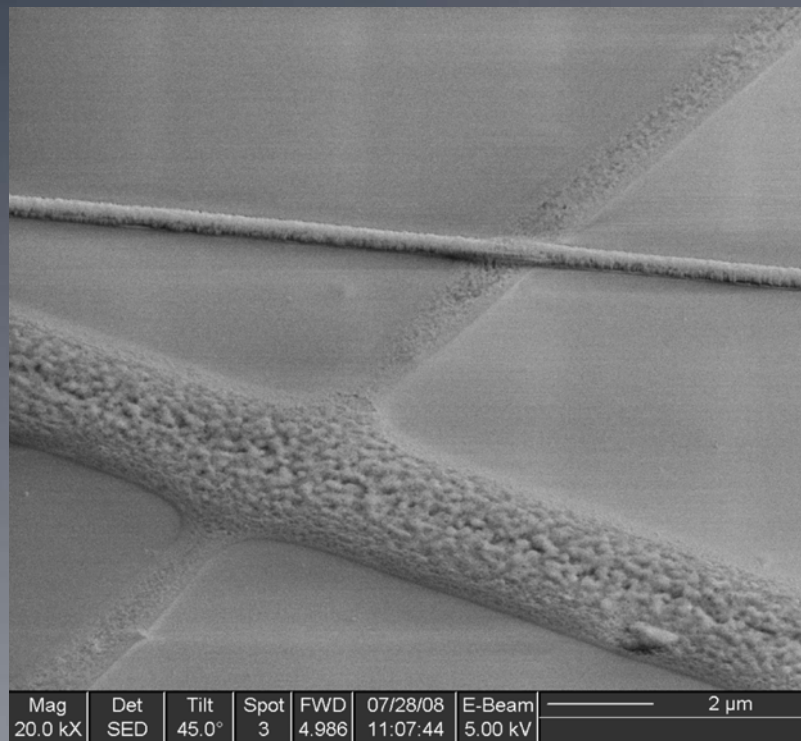
- Prepare a solution 19% wt/wt of Zinc Acetate in water.
 - Add a solution 13% wt/wt of Poly(ethylene oxide) in anhydrous ether.
 - Stir overnight.
 - Use the electrospinning technique.
 - Heat the fibers at 650°C for 6 hours.
 - Use characterization techniques.
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Outline

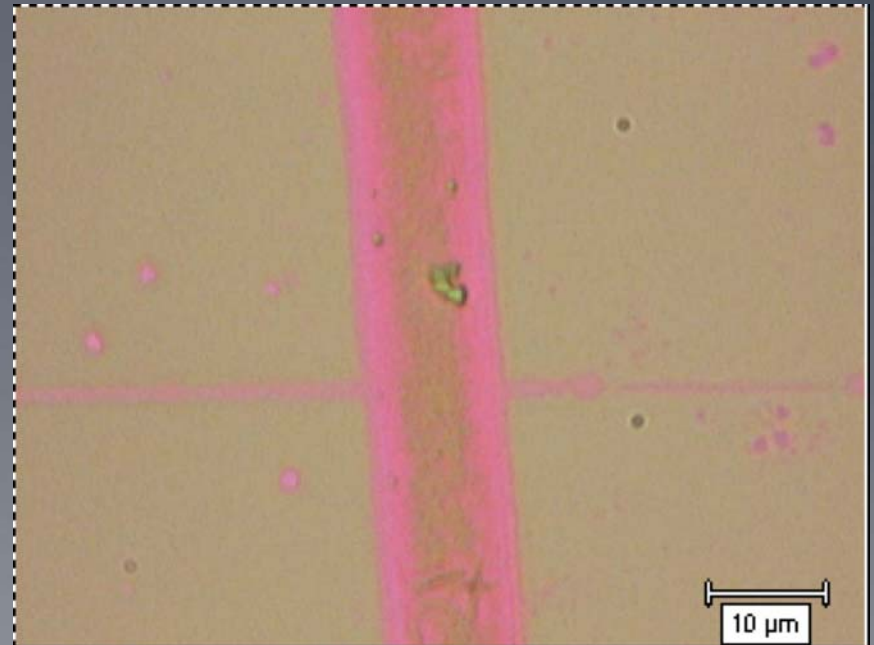
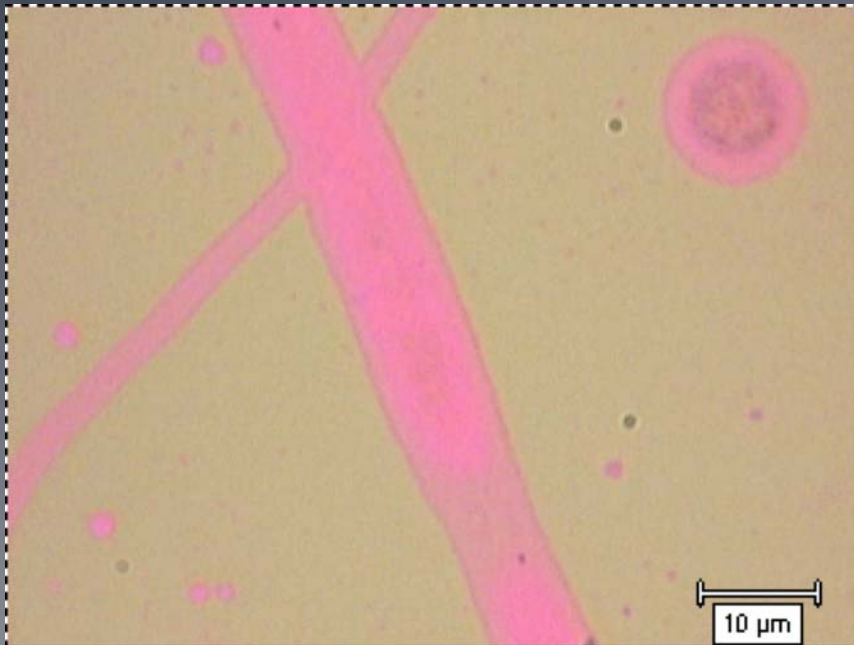
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Results

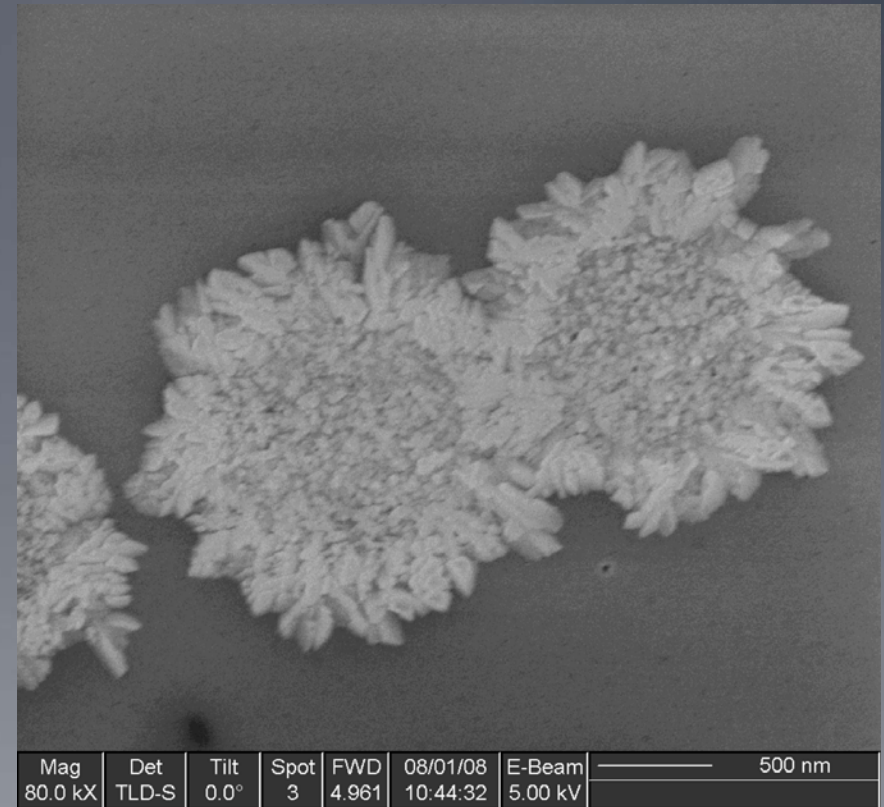
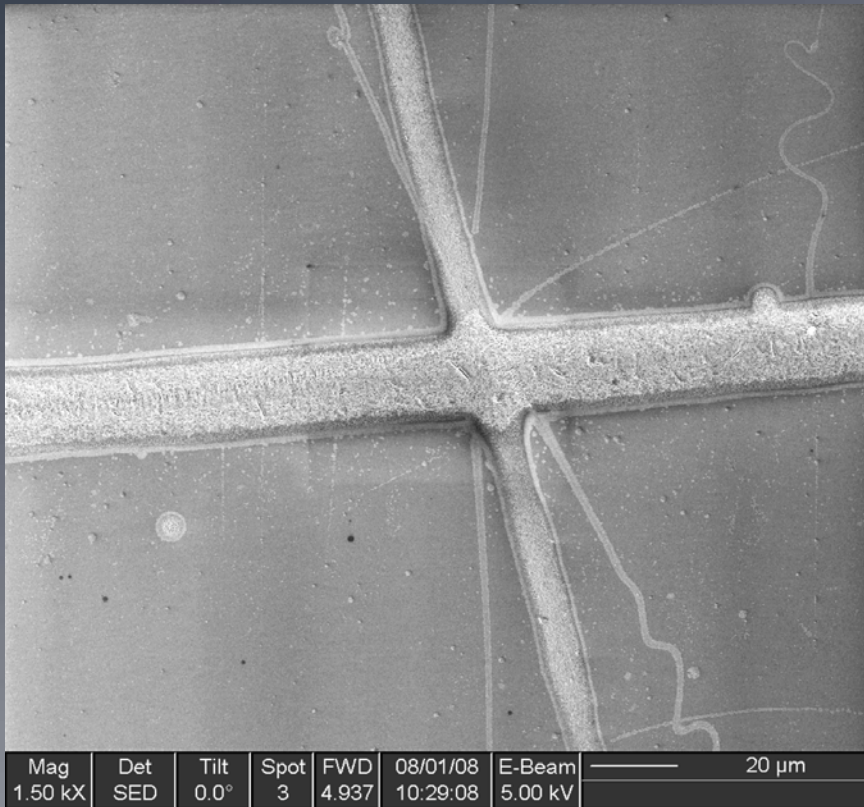
SEM photos of the unheated fibers



Optical Microscope photos of the heated fibers

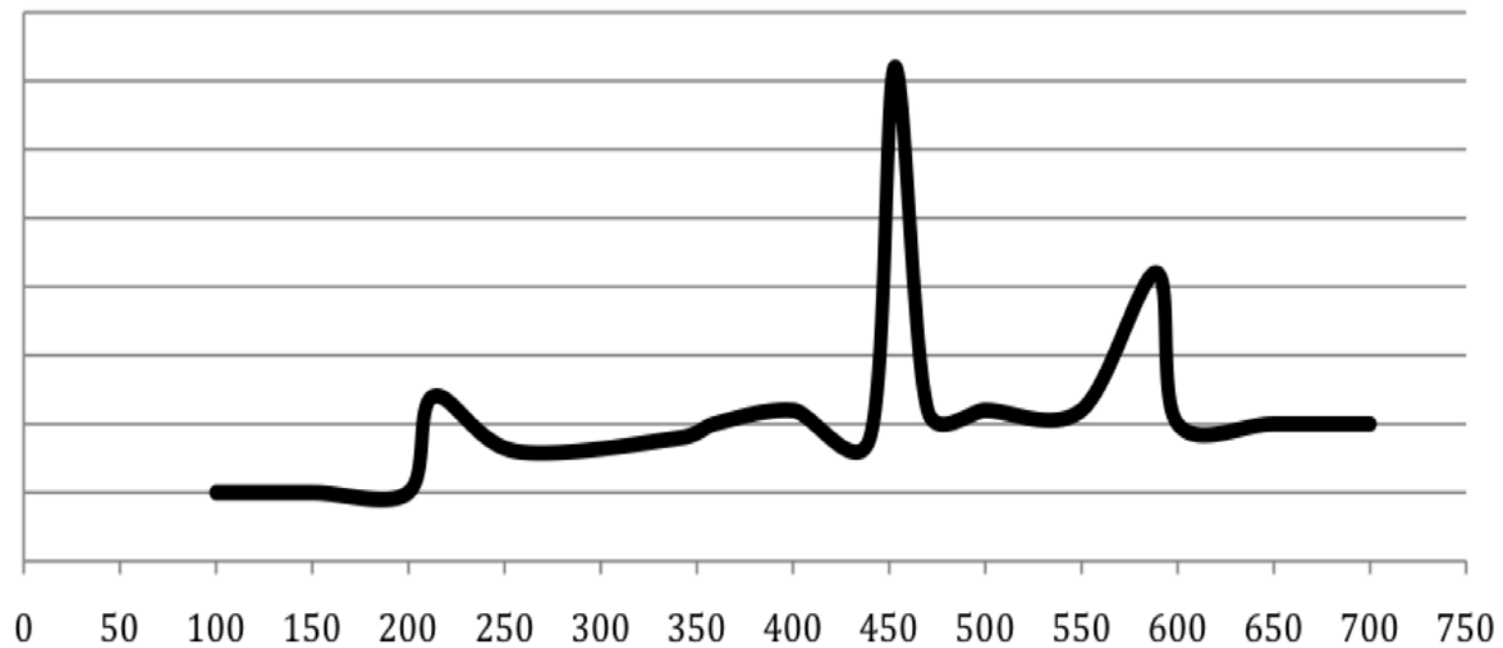


SEM photos of the heated fibers



Characterization

Raman Spectrum of ZnO Fibers



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Discussions and Conclusions

- With the methodology developed, fibers were made.
 - With the characterization we can say that the composition of the fibers is indeed zinc oxide.
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Future Work

- For the DSC, the semiconductor needs a certain alienation and methodology to obtain the fibers aligned must be developed.
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Acknowledgments

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 - NSF and the Microsoft Corp.
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