# Magnetoresistance of electrospun carbon nanofibers pyrolyzed at low temperatures


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# INTRODUCTION

## Carbon Nanofibers

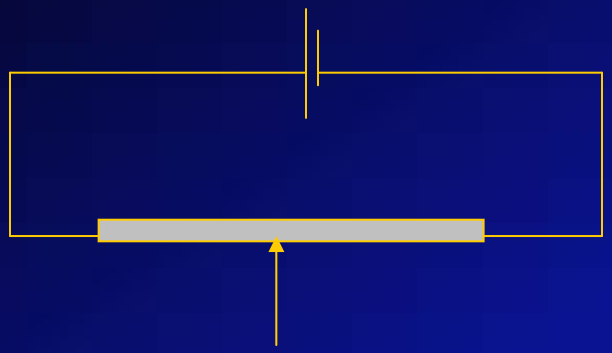
What exactly are they  ?????

What is so interesting about them ?????

Looking ahead - Potential Applications

# GOALS

## HE SENSOR APPLICATION



Carbon nanofiber

Resistivity

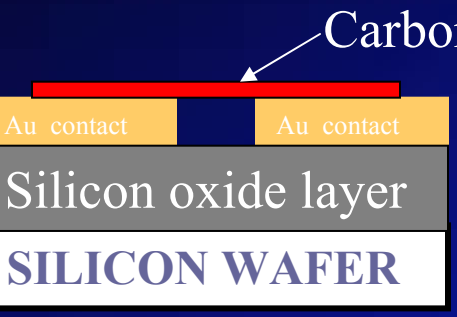
The current **I= VS/ ρL** , where represents the resitivity, V for ltage, S represents the cross ctional area and L represents e length of the fiber.

## HOW TO GET THERE

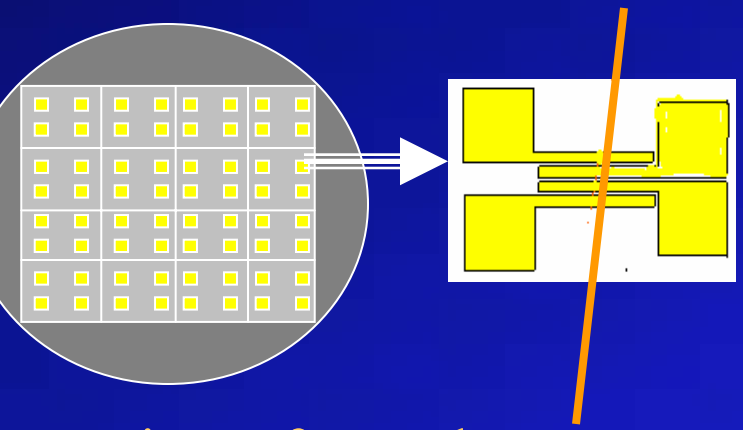
- Characterization
  - chemical properties
  - physical properties
    - **MAGNETORESISTANC**

# THE APPROACH

## tep 1 - Preparing the silicon wafer sample




ross-section of sample



Top view of sample

## Step 2 - Electrospinning

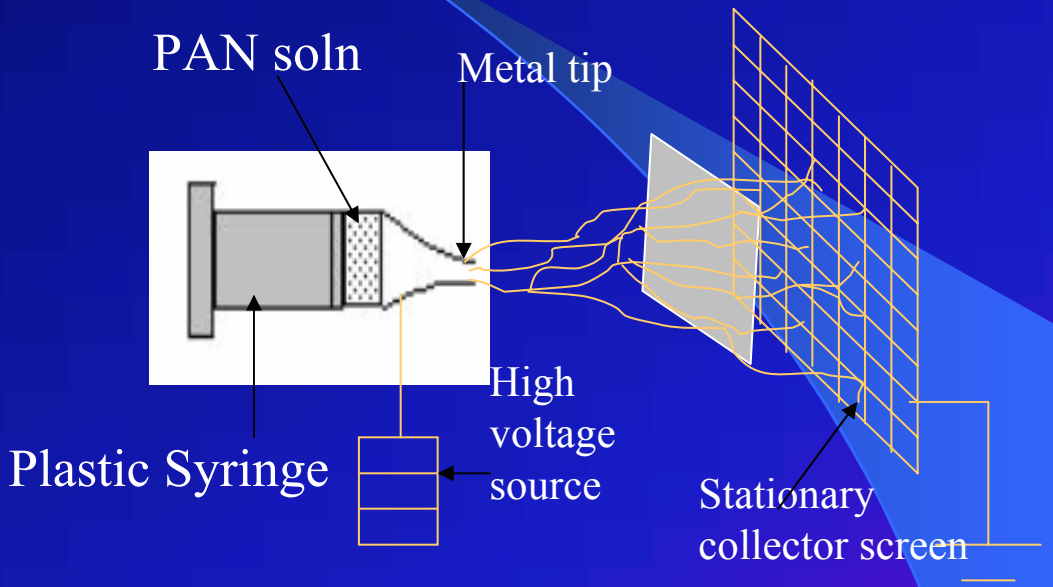
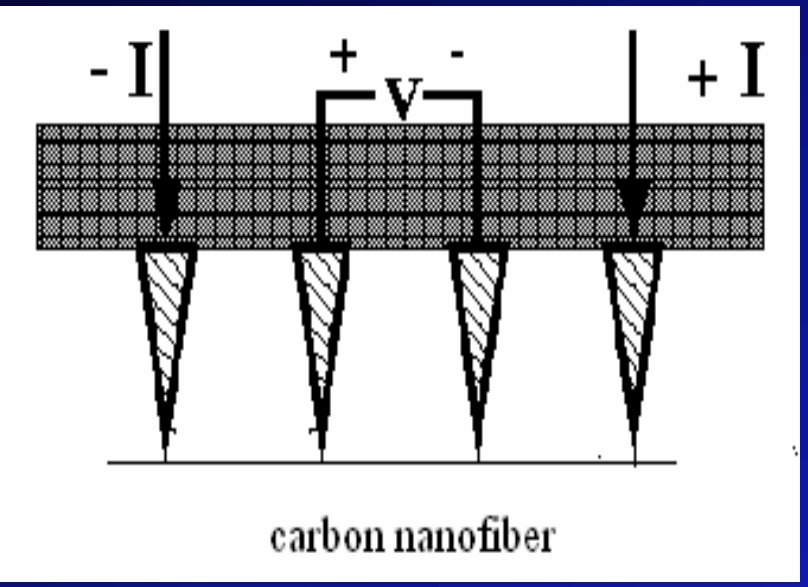



**Diagram of the electrospinning process**

# THE APPROACH contd

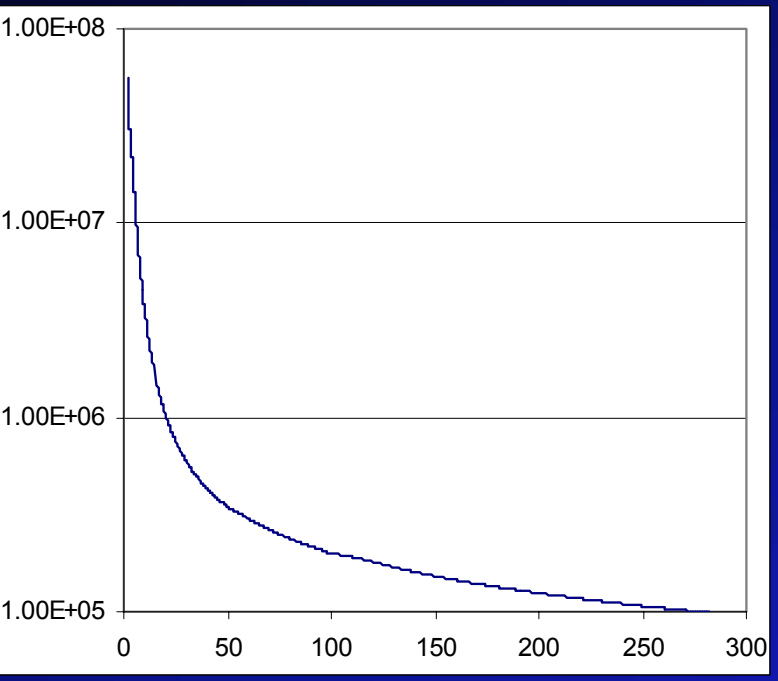



g. 3 The four probe configuration

redit - http://microlab.berkeley.edu/~ee143/ur-Point_Probe/ )

- Use the 4-point probe to measure the current and voltage of the semiconductor
  - At different temperatures ranging from 0K to 300K with n applied magnetic field
  - At different magnetic fields ranging from -9T to 9T applied perpendicularly to the carbon nanofiber at temperatures of 1.9K, 3K, 5K and 10K.

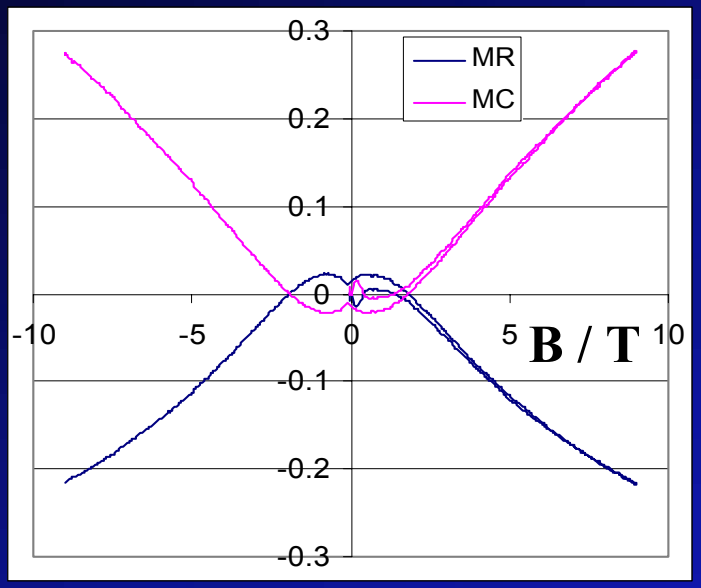
# RESULTS



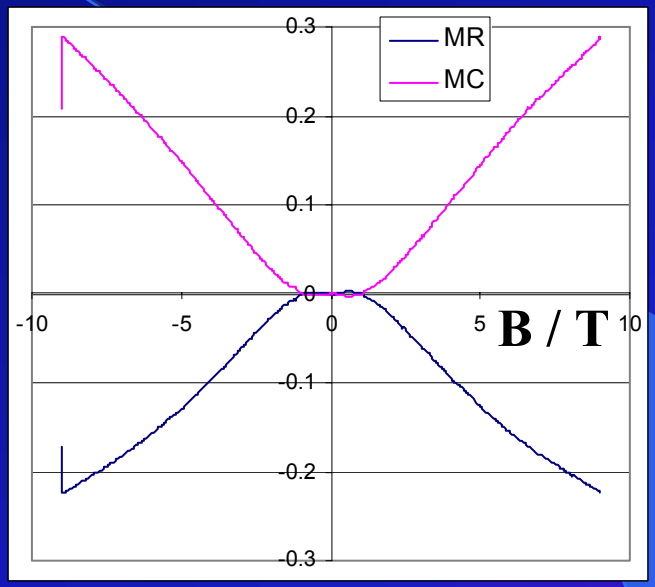

Graph showing relationship between resistance and temperature

- Electrical resistance decreases as temperature increases.
- This confirms the semiconductor properties of the carbon nanofiber

# Magnetoresistance results

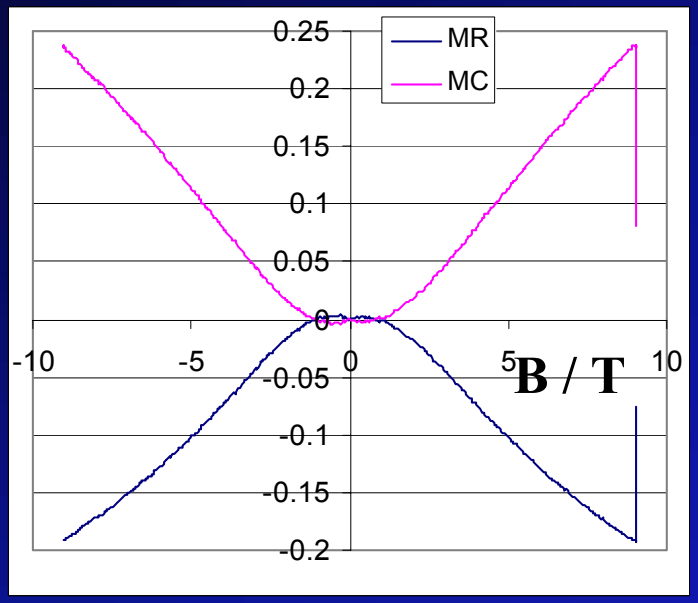



Results for measurements taken at 1.9K

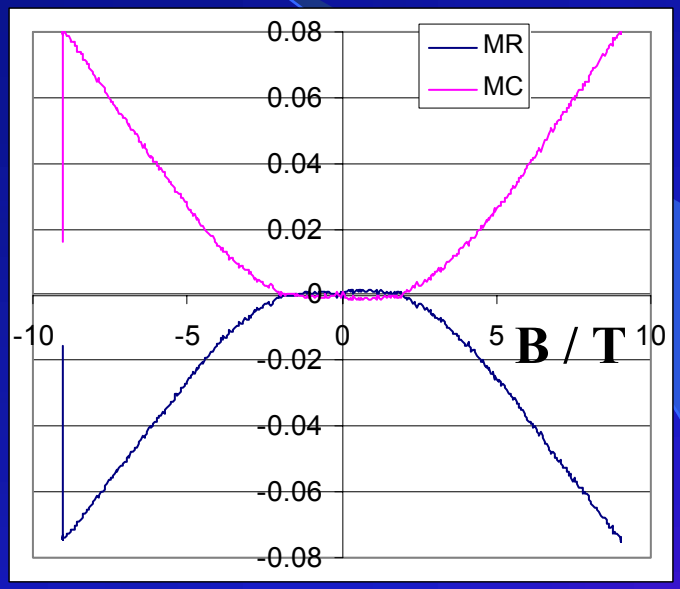



Results for measurements taken at 3K

# Magnetoresistance results




Results for measurements taken at 5K




Results for measurements taken at 10K

# CONCLUSION

arbon nanofibers pyrolysed at a temperature of 1173K exhibit semi-nductor properties. They also exhibit negative magnetoresistance at mperatures of 1.9K, 3K, 5K and 10K. The maximum value of 72% with agnetic field of 9T and a temperature of 10K.

# FUTURE WORK

The cross-sectional profile and areas of the nanofiber should be plored. This will allow us to calculate resistivity values.

By using Raman scattering, the levels of disorder in the fiber can be served and also the nanofiber can be characterized further.

he pyrolysis temperature should be changed and results compared

# Acknowledgements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