MSTA Annual Conference
March 1 – 2, 2019
Showcasing High School STEM research:
The Junior Science & Humanities Symposium
Dr. Sandra Yarema
Wayne State University
What is the Junior Science & Humanities Symposium?

The Junior Science & Humanities Symposium (JSHS) is designed to challenge, engage, and publicly recognize high school students who are conducting research in the sciences, technology, engineering, or mathematics (STEM).

• Individual students compete for scholarships and recognition

• Present the results of their original research efforts before a panel of judges and an audience of their peers.

• Program of the AEOP, supported by the Army, Navy, Air Force, the National Science Teachers Association, and Wayne State University (the regional institution)
What is the Junior Science & Humanities Symposium?

THE 55TH ANNUAL MICHIGAN REGIONAL JUNIOR SCIENCE & HUMANITIES SYMPOSIUM

WILL TAKE PLACE:

March 8, 2019
at
Wayne State University,
McGregor Conference Center
MSTA Annual Conference

What is the Junior Science & Humanities Symposium?

Participation in JSHS provides Opportunities for:

➢ Career/College exploration-
  • Participate in a forum honoring individual achievement in STEM
  • Develop & practice skills to help prepare for future pursuits in STEM fields
  • Hear nationally renowned scientists speak on their work
  • Research lab visits
  • Qualify for significant scholarships and other recognition

➢ Peer discussions and networking-
  • Conversations with peers who have similar interests
  • Hear research presentations by other students
  • Possibility to advance to the National Symposium

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What is the Junior Science & Humanities Symposium?

• Students who present their research at the Symposium have the opportunity to receive significant scholarships (Payable on matriculation to the University of their Choice)

Regional Symposium

- The NSTA will distribute $4,500 in academic scholarships to the top three regional finalists:
  • $2,000 to first place
  • $1,500 to second place
  • $1,000 to third place

- An ALL-EXPENSE-PAID trip to the National JS HS awarded to five finalists at each regional symposium (2019—Albuquerque, NM)

- A $500 award to the teacher of the 1st place finalist, honoring that teacher's and their school's contributions to advancing student participation in research
What is the Junior Science & Humanities Symposium?

- **National Symposium:**
  - The NSTA, in cooperation with the AEOP, distributes awards to the top 3 finalists in the National Research Paper Competition, in each of the divisional categories from among all 48 regions:
    - 1st Place: $12,000
    - 2nd Place: $8,000
    - 3rd Place: $4,000
  - Tri-service sponsored awards for excellence are also presented to students who participate with Poster Presentations of their research in each category:
    - 1st place: $1,000
    - 2nd place: $800
    - 3rd place: $600
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STEM Research Opportunities for Grades 9 -12?

Regional Math-Science Centers & Research Networks
- Past participants conducted research supported by:
  - Kalamazoo Area Math & Science Center
  - Battle Creek Math & Science Center
  - St. Clair Regional Math & Science Center
  - Michigan Sea Grant Extension
  - University Research Laboratories (CMU, MSU, Oakland U, WMU, U of M, WSU)
  - Local School Districts

- New This Year:
  - AEOP funded partnership between Wayne State University & TRIO sponsored COE- Upward Bound Program

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**STEM Research Opportunities for Grades 9 -12?**

AEOP funded partnership between Wayne State University & TRIO sponsored COE- Upward Bound Program

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<tr>
<th>Program Goals</th>
<th>Results</th>
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<tbody>
<tr>
<td>To increase participation in SE Michigan regional JSHS by students from underserved and underrepresented populations</td>
<td>140 % Increase: 15 presenters in 2017 23 presenters in 2018, 36 registered presenters in 2019</td>
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<td>To boost student exposure, engagement and success with STEM research, curriculum and activities and to nurture a love of STEM throughout the high school experience and from college to career.</td>
<td>Student participants experienced engaging and diverse, STEM related activities, on campus and in the field, in addition to attending the COE-UB (accredited) high-school science course.</td>
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**STEM Research Opportunities for Grades 9 -12?**

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| To promote the AEOP portfolio of STEM opportunities, specifically JSHS, and to link the AEOP framework to the COE Upward Bound Program at Wayne State University | All student participants:  
  • attended seminars, scientific meetings and discussion groups to enhance communication skills  
  • Built professional networks with peers, mentors, WSU faculty, and research professionals  
  • Received information about AEOP programs  
  • Engaged with the Junior Science and Humanities Symposium to present their research - Pending March 8, 2019 |
| To develop reciprocal relationships between AEOP and partner communities thereby increasing access and enabling more participants to engage in scientific meetings/technical symposia where they can showcase their STEM achievements |  

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How to participate in the JSHS

Visit:
http://coe.wayne.edu/ted/science/jshsindex.php

• Click on the tab *How to Participate*, and then click *Start Here*

  ➢ Access the linked information, resources, and guidelines for applying to participate in JSHS- including format & submission of:
    ▪ abstract,
    ▪ research paper
    ▪ poster

  ➢ Electronic registration procedures for permission & approvals from:
    ▪ parent
    ▪ sponsoring teacher
    ▪ research mentor
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*Junior Science & Humanities Symposium*

Judging Categories:

- Biology - Genetics, Medicine, Bio-chemistry, Environment
- Chemistry - nanotechnology, materials
- Physics - biophysics applications, astronomy
- Mathematics
- Engineering - applied science

Paper Topics of Finalists from Past Symposia:

- *The Longevity of Carbon, Graphite, and Silver Based Strain Gauges*
- *Effect of Cucumber Fruit Peel Extracts on Inhibition of Phytophthora Capsici growth and Infection*
- *Interaction Between CD47 and EGF Receptors in Breast Cancer Stem Cells*
The Longevity of Carbon, Graphite, and Silver Based Screen Printed Strain Gauges by

Example of Poster from 2015

Abstract

The purpose of the research was to discover the effect of moisture on carbon and graphite screen printed strain gauges. Three samples of each type of ink were printed and each sample was tested at 10 different moisture levels, from 1% to 5%. Data was captured using a custom LabVIEW program and read from a precision LCR meter. The test was designed to determine how different samples respond to moisture and strain. At the end of the research, it was concluded that moisture does not change the mean or maximum strain of the samples. The mean strain of the samples was not found to change with moisture.

Introduction

Screen printed strain gauges are used to measure the strain of a material. In this study, three different inks were used to create the strain gauges. Each type of ink was printed on a 100 mm x 100 mm square of Kapton. The Kapton was placed on a metal plate and the strain was measured using a precision LCR meter. The samples were then allowed to sit for 30 minutes and the strain was measured again. The mean strain of the samples was found to be approximately 10%.

Results

Data Acquisition

The mean strain of the samples was then calculated and plotted on a graph. The graph shows the mean strain of the samples as a function of moisture. The mean strain of the samples was found to be approximately 10% for all moisture levels.

Conclusions

These results differ from previous studies that have shown that the strain of carbon and graphite increases with moisture. This is because the moisture content of the samples was found to be approximately 1% for all moisture levels. The results of this study suggest that moisture does not change the mean or maximum strain of the samples. The mean strain of the samples was found to be approximately 10% for all moisture levels.

Acknowledgements

I would like to thank the University of Michigan for use of their facilities, and the NSF for a research grant. I would also like to thank my advisor, Dr. Sandra Yarema, for helping me with the data collection and analysis. Finally, I would like to thank the reviewers for their comments on the manuscript.
MSTA Conference
Junior Science & Humanities Symposium

College of Education

Walter Reed Army Institute of Research, Baltimore, MD (2015)
Wright-Patterson AFB, Dayton, OH (2016);
Point Loma Naval Research Center, San Diego, CA (2017)
Registration for SE Michigan JSHS 2020 will open October 4, 2019. The deadline for submission of student research papers and application materials is January 15, 2020

- The Symposium is a valuable resource for students who plan to participate in this year's Science Fair and/or Science Olympiad.
- All the application forms, guidelines and other information are available at:

  http://coe.wayne.edu/TED/science/jshs/

For additional information contact:
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