

Studying Membrane Strain and Conductivity for Resistive Tomography Applications

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Onsager with collaborators in the Lachman Lab

The NU-TAU Nanoscience and Nanotechnology Exchange enhanced research ties between the two universities and furthered the collaborative efforts between the Lachman group at TAU and the Grayson group at Northwestern. It was an interesting experience to learn how a different university and research group function. This exchange allowed for enhanced communication related to our work in the study of mechanical and electrical responses of conductive nanotube composites under strain. While working at TAU, I was able to share my knowledge in the area of electrical engineering, while at the same time learning more about composite materials from the students and professors in Israel.

The first part of my stay involved the comparison of the stress-relaxation measurement systems that exist at both universities. As part of a prior collaboration, we built twin measurement systems from the same collaboratively designed blueprints. These stress-relaxation measurement systems monitor material stress and conductivity relaxation in the presence of applied strain and current. During the exchange, I was able to observe how their setup functions while helping supervise experiments done by local high-school aged students. Then, we compared the two setups and discussed the difficulties that were encountered during fabrication and measurement. The exchange provided the proximity for a faster exchange of information by which we could learn from each other and establish standardized methods for data collection and analysis. I was able to bring suggestions and electrical engineering experience to help improve the quality of data from Lachman group's setup and brought back ideas for improving our setup at NU.

Through the collaboration between the Lachman and Grayson groups, we are studying the electrical and mechanical properties of silicone rubber composites infused with varying

concentrations of carbon nanotubes. One of the most beneficial aspects of the exchange was the ability to learn more about these materials that were developed by the Lachman group. I toured the facility in Israel where these material are produced. By witnessing parts of the manufacturing process firsthand, and learning about different methods of material characterization, I was able to build a better understanding of the material to inform future analysis.

As the final part of my trip, I was able to introduce the Lachman group to my work using these jointly studied conductive membranes for resistive tomography applications. During my stay, I was able to give a presentation on the tomographic method and show their group what materials and analysis would be needed to create their own tomographic touchpad setup for future collaborative experiments. Overall, it was an enriching and informative exchange experience that improved the communication between our research groups.

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