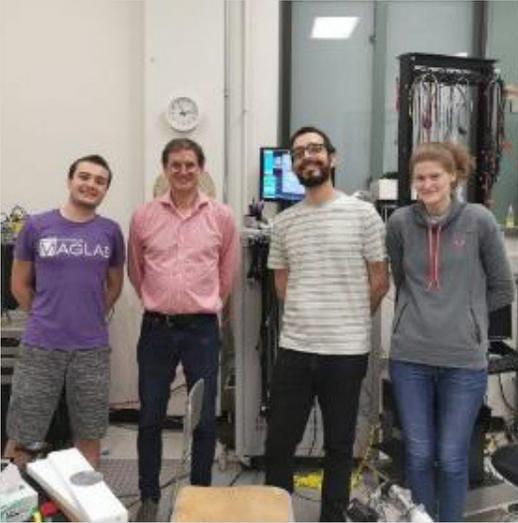


Dielectric Relaxation Behavior of VMQ/CNT Self-Sensing Stretchable Electrodes

Lev Rovinsky, Tel Aviv University

Host Professor: Matthew Grayson, Northwestern University



Grayson Group members Can Aygen, Matthew Grayson, Lev Rovinsky, and Claire Onsager

My name is Lev Rovinsky, currently working on my PhD in Materials Science and Engineering, under the guidance of Dr. Noa Lachman, at the Tel Aviv University. My PhD is a part of joint research project between Tel Aviv University and Northwestern. The research is multi-disciplinary, spanning the materials science(TAU group) and electrical engineering (NU group) aspect of electrically conductive rubber, for the purpose of fabricating novel touchpads. The investigated rubber was impregnated with CNT, in order to grant it electrical properties, as well as increasing its toughness and hardness. This fellowship allowed me to travel to the other leg of the research, and perform experiments with the second group, exposing me to the other side of the project. During these three months, I've worked with Grayson group students, not exclusively but largely with the counterpart graduate students, Claire

Onsager and Can Aygen. Together, we tackled the main challenges of the research – increasing the trustworthiness of the measurement procedures and deepening the collective understanding of the proposed mathematical construct.

1. I've been extensively introduced to the theories leading to the formation of the project, and have performed numerical simulations of the most up-to-date understanding of relaxation phenomenon. The simulations visually demonstrate particles behaving according to the theory, which allowed further tailoring of the mathematical construct.
2. I've assisted Claire in performing dynamical mechanical measurements of polymers samples, to grasp hands-on experience with materials which are known to obey a certain set of characteristic properties, representing a certain outcome of the proposed mathematical model.
3. I've invented and fabricated an auxiliary tool for controlling to applied stress on the touchpads, based on calibrated dislocation damped by springs of known values. Next, sample preparation, machining and appropriation was normalized as per ASTM regulations for handling composite conductive rubber specimens.

4. I've acquired schematic understanding for solving measurement problems encountered, spanning increasing measurement accuracy and data acquisition rate, and decreasing measurement noise.

5. During my stay, I've gave two introductory presentations, (1) about conductive polymers, their properties, and relevant quantitative models (2) about carbon nanotubes, their preparation and properties.

This collaboration was bi-directionally fruitful, for it allowed both sides to learn about the other's theoretical background, establishing the fundament for understanding the jargon of each profession, further nourishing the soil for further joint research. This collaboration has allowed me to experience a different work environment, with different work etiquette, and I have returned with insights, which I would implement in my own research. All of the members of the host group are very friendly, supportive and received me with open hands. Prof. Grayson, my host PI at Northwestern was pleasant, supporting and guiding, and his door was always open, for every issue I encountered, whether academically and outside the university.

Northwestern University

