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Jozef Soloff Shares Thesis on Solar Cells and Reflections on the Election

Jozef "Zef" Soloff, an alum from the Environmental Studies program, completed his thesis last semester on solar cells.

HIS THESIS IN HIS OWN WORDS

My thesis asks the question *What are people doing to make solar power available to anybody who wants it?* through the dye-stained lens of Natural Dye-Sensitized Solar Cells (NDSC), a developing solar technology. NDSC harvest sunlight with pigments taken from flora, and are cheap and easily made. My thesis explores ways that NDSC may empower people to choose where the energy they use comes from.To answer this question I performed a literature review that focused on grassroots DIY production of NDSC. I then interviewed students in the Environmental Studies program and surveyed researchers. Through this process I recognized that energy was social, that the city is efficient when the commons are empowered, and that improving energy literacy and participation are as necessary as improving technologies in order to realize a society that generates and consumes energy responsibly.The thesis really was a collaboration. Making these solar cells, along with fellow New Schoolers Ana Pamia and

Sasha Hodson, and with the help of our professor Bhawani, was an enlightening experience. We hope to share this experience with other students in a Tishman Center Skills Lab later this semester. In this Skills Lab we will build the cells and explore how to design with them. If you are interested please email me at zefegan@gmail.com.

ZEF'S REFLECTIONS ON CREATING SOLAR CELLS AFTER THE ELECTION OUTCOME:

THE DAY WE MADE SOLAR CELLS

The morning following the day after the election I found myself in a lab with my friends, Ana and Sasha. We had made a tiny solar cell with some paste and hot plate. The cell had been dyed with mulberries that Sasha's grandma had foraged from a neighbor's backyard in Brooklyn, that had been frozen since the summer. The metal oxide paste had chipped in places from my mishandling of it with the purple plastic tweezers that the kit gave us. The yellow iodide electrolyte leaked from the scotch taped edges of our tiny cell. In goggles and gloves we held the cell to the light streaming through the window.That morning my voice was hoarse. The night before we had marched through traffic from Union Square to Trump Tower with other young people who had witnessed the future they were fighting for compromised by the inanity of prejudice and profits. The march was a confluence of protest. Amidst shouts of Black lives matter! Our bodies, our choice! Whose streets, our streets! the youth of the city held fast to what they held in common. Somewhere among the entangled struggles lay our hope for the planet. So I lost my voice shouting slogans at traffic. A man in a FedEx uniform leaning from the door of his truck and had joined his voice to those of protest. Cab drivers from around the world honked in unison to the curses

and affirmations.Yesterday had been drizzling. This morning was sunny. A day you could see forever and walk with just a light jacket through the bright fall air. I was nauseous and uneasy, had held back tears on the train, without any real idea why - just glancing at the other commuters my eyes moistened and my throat tightened. In Chemistry Class I raved about corruption of the media and of our discourse. Surely there was another discourse of those riding together to work. So here I was in the lab with my friends building "Natural Dye-Sensitized Solar Cells," a mouthful I was writing my thesis on, all the research I had done seemed distant. It took my mind off the election to check which side of the glass was conductive with the ammeter and to try to spread the metal oxide paste evenly. I was grateful to be collaborating.The cells turned brown and then white again as the titanium dioxide crystalized on the hot plate, forming the electrode that the mulberry dye would photosensitize. Only a bit of the aluminum foil melted onto the plate in the process which Ana scraped off while it was still hot. I lifted the cells from the hot plate with the plastic tweezers melting the tips of the tweezers. My friends laughed and the cells survived. Ana and Sasha smiled while dipping the slides in the crushed mulberries juice.

Ana held the cells while the Sasha squirted them with deionized water and ethanol. The photoanode now smelled like a fruit flavored liquor.We penciled in the conductive side of the other slide. The thin layer of graphite constituted the cathode. In this way all the papers I had read on the expense of liquid electrolytes and the efficiency of various metal oxides materialized into a couple funny smelling little slides held together with binder clips. Peering through the mulberry stained electrode and the yellow iodide electrolyte the thing looked like a funky bacterial growth that I for one did not honestly would work. Holding the cell to the window I glanced at the ammeter for the reading. The sunlight warmed my hand. I put the cell on the table and cupped my hands over the cell and read the ammeter, a little current then none. I opened my hands the current shot up.So we paraded in our goggles and gloves onto 6th Ave with our professor Bhawani and the solar cell. We found the brightest patch on the sidewalk and stood there holding the cell to the sun. Perhaps several of these things could light a LED. We stood among the Con Ed orange and white steam stacks and the traffic stalled at the light and held this little thing we had done ourselves to the sun. We all had to get to class. So we put away the berries and the beakers and

discussing all the while how to move forward. Walking to class I compulsively read on my phone about the growing popular vote victory for Clinton, who I had not voted for, but who my mother and grandmother had such hope for, and who had lost to a man who threatened my city and my generation. I thought about my friends and the protesters. I thought about the commuters and the discourse that had not been corrupted.

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