

John Mauro, Pennsylvania State Univ University Park

- This project studies relaxation, an inherent behavior in glasses that impacts many industrial applications. For example, relaxation can cause pixel misalignment in LCDs and impact the overall strength of glass and the optical properties of fibers.
- One goal of this project is to design glass compositions with limited relaxation.
- This research is focused on a glass family of sodium aluminosilicate glasses where the ratio of $\text{Al}_2\text{O}_3/\text{Na}_2\text{O}$ (R) varies from 0 to 1.44, and the SiO_2 amount is constant at 61 mol%.
- Current results of the activation energy of enthalpy relaxation from differential scanning calorimetry show no conclusive minimum in relaxation for current compositions where $R < 0.7$.
- However, enthalpy of relaxation results from modulated differential scanning calorimetry show a minimum between $R = 0.2 - 0.5$, thus more MDSC will be conducted and glasses with a higher R value where synthesized.
- More work is also being done to compare the two MDSC techniques – nonreversing heat flow and the complex heat capacity.



Piece of sodium aluminosilicate glass synthesized in the lab with a ratio of $\text{Al}_2\text{O}_3/\text{Na}_2\text{O} = 1.17$.

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- The lead PhD student on the project, Brittney Hauke, helped run the 2022 Physics Congress that took place in October in Washington DC. The Physics Congress takes place every three years and is the largest gathering of undergraduate physics majors in the country. Brittney made sure the entire event ran smoothly and was part of the planning committee. She also sat on a panel discussing graduate school in materials science.
- Brittney was a volunteer at the 2023 Center of Science and Industry (COSI) Science Festival in Columbus, Ohio and assisted the American Ceramic Society (ACerS) with their booth demonstrating fun experiments on glass science for kids, like a jolly rancher fiber draw. This year they partnered with Owens-Corning and focused more on fiber glass.
- Brittney attended the American Institute of Physics board meeting in June to talk about how to support undergraduates in physics, a topic important to her since she got her BA in physics (and studio art).



Brittney Hauke (front left) and other volunteers at the 2023 COSI Science Festival.