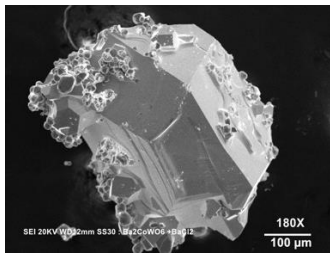
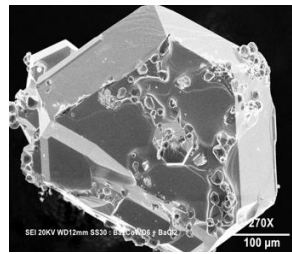


I work as an undergraduate research assistant in Dr. Jasminka Terzic's lab. I have been a research assistant for Dr. Terzic since November 2021. The lab is in the subject of condensed matter physics. The project includes the study of new double perovskite materials that incorporate 3d and 4d/5d transition metals. I studied many materials which potentially hosted multiferroic properties. Through this project I have had the opportunity to learn multiple ways of growing materials, characterizing materials, and testing their physical properties.

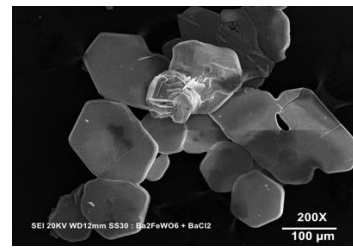
My part in this project has been attempting to grow new materials. I have grown polycrystalline samples by grinding together raw powder material in a mortar and pestle. I anneal these samples to high temperatures using a furnace to get them to react with each other. I have used the flux method to grow single crystals. This includes grinding raw powder materials or polycrystalline material with a flux. In our case, the flux is a salt that has the same cation as the material we are trying to grow. Part of my contribution to this research has been looking into past literature and research into similar materials to aid us in altering the single crystals growth parameters. This includes figuring out what temperature to anneal to, duration of annealing, and cooling rate.



Single crystal sample: BaCoWO

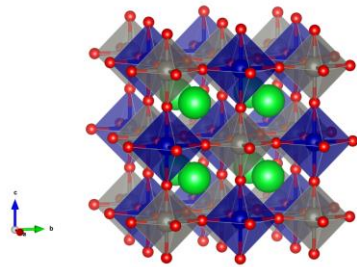


Single crystal sample: BaCoWO

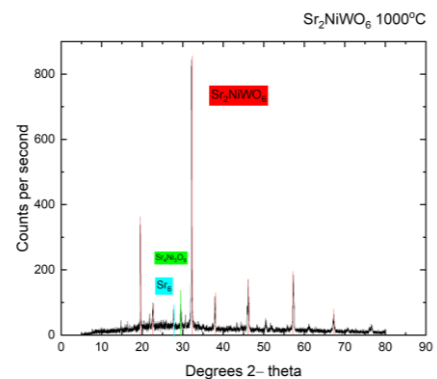


Single crystal sample: BaFeWO

Another contribution I have had to this project is characterizing the materials I have grown. I have used the Scanning electron microscope (SEM), as well as Energy Dispersive X-ray Spectroscopy (EDS), to analyze my samples. This gives me insight as to what my crystals look like, as well as what elements are in my sample. Additionally, I have used the Bruker XRD for powder x-ray diffraction to characterize and identify phases of polycrystalline samples. I have also used Single Crystal X-ray Diffraction (SCXRD) to solve the atomic structure of single crystals.



Single Crystal XRD unit cell found for Sr_2CoWO_6



Powder XRD result found for Sr_2NiWO_6

Our upcoming work on this project includes testing the properties of the single crystals we have grown in the lab. We plan on looking at their electrical, thermal, and magnetic properties. This will potentially be done at Oakridge National Laboratory. The thermal property

we will examine include heat capacity to find the lattice structure and electronic structure. The electrical properties include electrical resistivity to analyze the charge transfer properties. The magnetic properties studied will be looking for the presence and alignment of a magnetic moment to classify the materials type of magnetism.

I was also able to give poster presentations of this research at a few different research conferences. These include the Southeastern Section of the American Physical Society's annual meeting in 2022, the Kentucky Academy of Science's annual meeting in 2022, the Conference for Undergraduate Women in Physics annual meeting in 2023, and Super Collider in 2023.