

## Plan Overview

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*A Data Management Plan created using DMPTool*

**Title:** Transport and Magnetometer Measurements on Mechanically-Surface-treated NiS<sub>2</sub> Crystals

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**Principal Investigator:** sami elkhatib

**Template:** Data Management Plan - AUS Funded Research

### Project abstract:

This work focuses on the pyrite structure transition metal disulfide NiS<sub>2</sub>, which has been studied for decades as an model antiferromagnetic Mott insulator, although many aspects of its electronic and magnetic properties have proven to be very difficult to understand. In essence, in this work we are planning to show that one of the main contributing factors to the confusion regarding the electronic properties of this material is the existence of *surface conduction*, which was ignored in almost all prior studies of this material. We use high quality single crystals, applying a spectrum of transport approaches and magnetometers that have not previously been applied to this material. The plan on this is to show that surface conduction *via* unique temperature dependence, thickness scaling, sensitivity to surface treatment, , and magnetoresistance measurements and analyses. While a couple of prior reports have provided *some* evidence for surface conduction in NiS<sub>2</sub>, this project plan goes beyond those, clearly establishing this phenomenon and understanding its phenomenology in substantial detail.

In addition to the huge experimental work to execute this project, it takes into consideration training graduate students here at AUS considering his tuition fees and stipend for 2022/2023 academic year. My graduate student will be working on this topic, collecting transport and Magnetometer using Physical Properties Measurements system, XRD and EDS. The data on this topic is still under investigation, and in the main body of the project, I am showing some high quality results that will be combined with the data that we propose in this project for future publications

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# **Transport and Magnetometer Measurements on Mechanically-Surface-treated NiS<sub>2</sub> Crystals**

## **Data Collection**

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**Give a summary of the data to be collected or produced.**

Data will be collected by using PPMS, EDS, and XRD to measure transport and magnetic properties of NiS<sub>2</sub> single crystals.

## **Storage and Back-up**

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**How will the data (digital or non-digital formats) be stored and backed up during the research?**

Data will be saved on data acquisition computer and will be backed up regularly using external hard drive.

## **Access and Use Rights**

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**What steps will be taken to protect privacy, confidentiality, intellectual property or other rights?**

There are no privacy requirements, data and analysis will be available to people in the materials laboratory.

## **Sharing Data and Controlling Access**

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**Will data be shared during the course of the project?**

Data will be shared internally to students and the PI. Data will be presented in conferences in a discussion way and exchanging ideas in preparation final version.

## **Data Organization, Documentation and Metadata**

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**What documentation and / or metadata (information about the data) will ensure data can be retrieved and used?**

Data will be localized in PPMS computer and external hard drive with proper name and directory that are easy to access in the future.

## **Data Preservation and Archiving**

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**Should the data be considered for permanent retention / archiving?**

Backing up data on different computers and external memory.

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