

**OXYDATION STUDY OF A SELENIDE COMPOUND BY TGA FOR PHOTOVOLTAIC APPLICATION**
**INTRODUCTION**

While photovoltaic conversion efficiency is the most studied and compared property of solar materials, it is not the only important one. For example, the durability of solar cells is also important, because of its impact on service life and conversion efficiency. Oxidation of photovoltaic material is one of the possible causes for the durability limitations of photovoltaic cells.

A team of researchers from Greece studied the oxidation behavior of a copper selenide compound. This material has good potential for use in thermoelectric and photovoltaic conversion. Thermogravimetry was used to measure the oxidation resistance of this material.

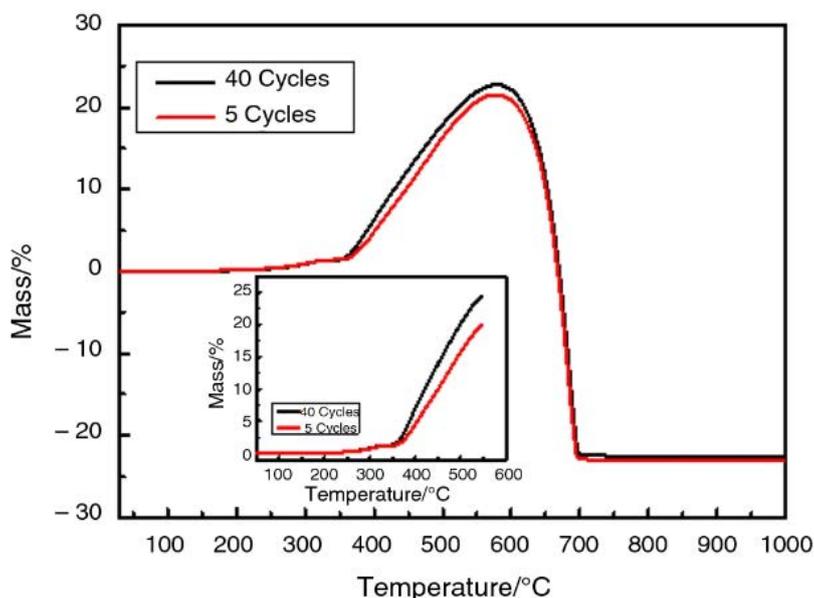
**EXPERIMENT**

- Sample:  $Cu_2Se$  compound (60 - 65mg) synthesized by ball milling for different duration (5 or 40 cycles)
- Instrument: Themys TGA (formerly Setsys)
- Thermal profile: heating from room temperature to 1000°C at 10°C/min
- Atmosphere: 50 mL/min

**RESULTS**

The TG curve shows a mass increase corresponding to an oxidation process starting at 165°C and 172°C. The difference in oxidation rate at the onset point can be explained by the difference in specific surface area between the samples.

Above 600°C, the TGA signal changes its behaviour as the Se evaporate, causing a significant mass loss.



This experiment shows that this compound has a relatively good resistance to oxidation. The measured onset point of oxidation should however be considered as a maximum processing temperature.

*Tarani, E., Stathokostopoulos, D., Karfaridis, D. et al. Effect of ball milling time on the formation and thermal properties of  $Ag_2Se$  and  $Cu_2Se$  compounds. J Therm Anal Calorim 148, 13065–13081 (2023)*

**INSTRUMENT**
**THEMYS TGA**

**HIGH ACCURACY & VERSATILITY**

Hang-down symmetrical beam balance, specifically designed for TGA applications

**ULTRA-HIGH TEMPERATURE CAPABILITY**

To 2400°C with a single furnace

**MODULAR ADAPPTIONS ALLOWING**

TGA only, DTA only, TG-DTA, and TMA UP TO 2400°C, DSC only and TG-DSC up to 1600°C all in one instrument.

**EXTERNAL COUPLING CAPABILITY**

Designed for evolved gas analyzers (FTIR, MS, GCMS, MSFTIR or FTIR-GCMS).