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Project Acronym: **KESTCELLS**

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Industry-Academia Partnerships and Pathways

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## ***Deliverable D2.2***

# **Materials Data Correlated to: Evolution of Phases with Variation in Conversion Conditions and Precursor Composition**

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Workpackage	2: Development of absorbers by PVD and chemical based processes.
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## Introduction

The aim of this deliverable was the investigation the evolution of phases in the Cu-Zn-Sn-Se and Cu-Zn-Sn-S materials systems and correlation of this with precursor composition and conversion conditions.

From the understanding gained about the interrelationship between the phase evolution, precursor composition and processing conditions, these factors can be used to optimise the absorber layer materials for devices.

Two processes investigated, both were 2-stage processes based on sputter deposition of precursor layers followed by a conversion or annealing stage to produce the absorber layers.

In Section 1, NU reports, on the investigation of absorber layers produced by the deposition of metal (Cu/Zn/Sn) multilayer precursors that are subsequently heated with selenium to form the selenide form of the kesterite layers. The conversion temperature and precursor composition were studied via ternary precursors and binary, Cu-Zn and Cu-Sn, precursors.

In Section 2, UU-ASC reports on their 2-stage process in which sulfur-containing precursor layers are deposited by a reactive sputtering process that are subsequently annealed to produce the sulfide form of the kesterite absorber layers. The report presents the investigation of sputtered and annealed layers from a single target, from two targets and from three targets.

Details of each process, the results and conclusions together with relevant references are contained within each section. A summary and conclusions for this Deliverable are given at the end of the report.