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Wavelength Scanning Interferometry for large area roll to roll metrology applications in photovoltaic manufacturing environment

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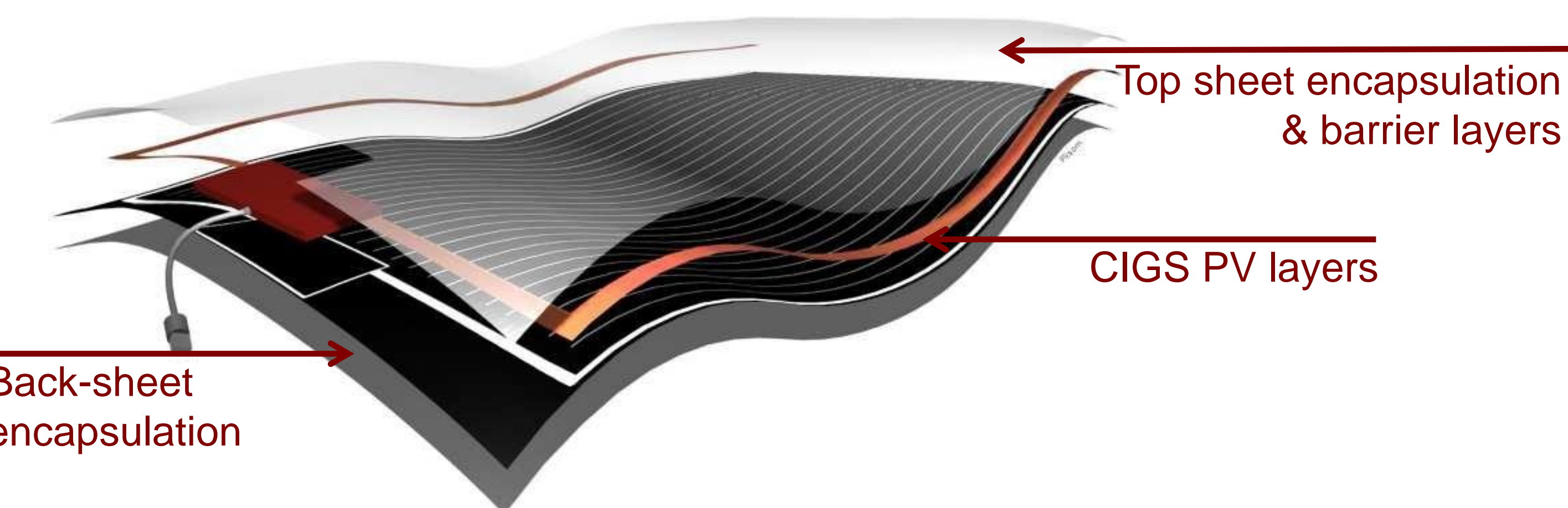
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Introduction

The wavelength scanning interferometer is currently being applied as a core metrology technology as part of the EU project **NanoMend - Nanoscale Defect Detection, Cleaning and Repair for Large Area Substrates~500 mm width**.

NanoMend Project Aim: To develop technologies that are able to detect and correct micro and nano-scale defects in roll-to-roll produced films in order to improve product performance, yield and lifetime.

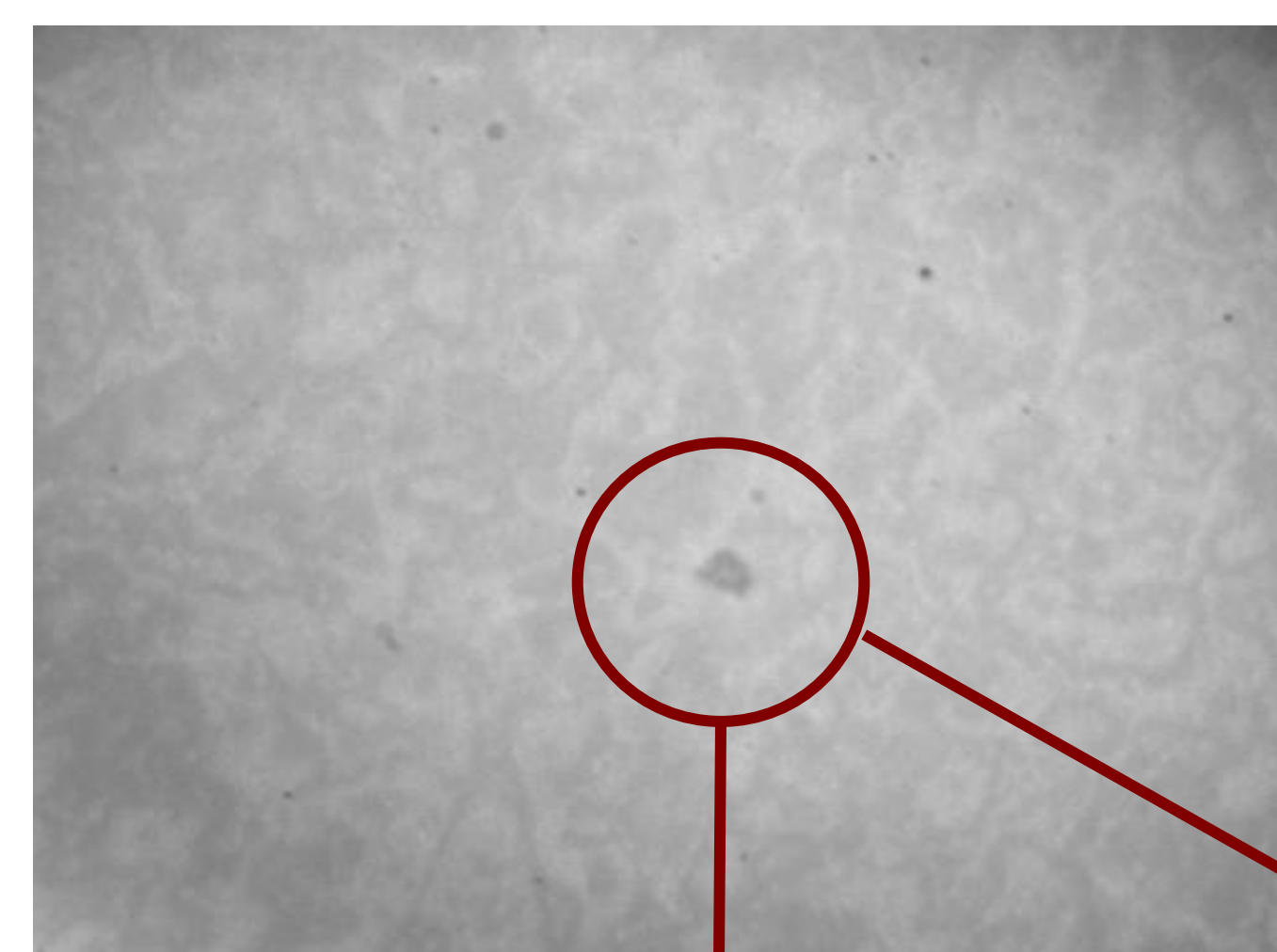
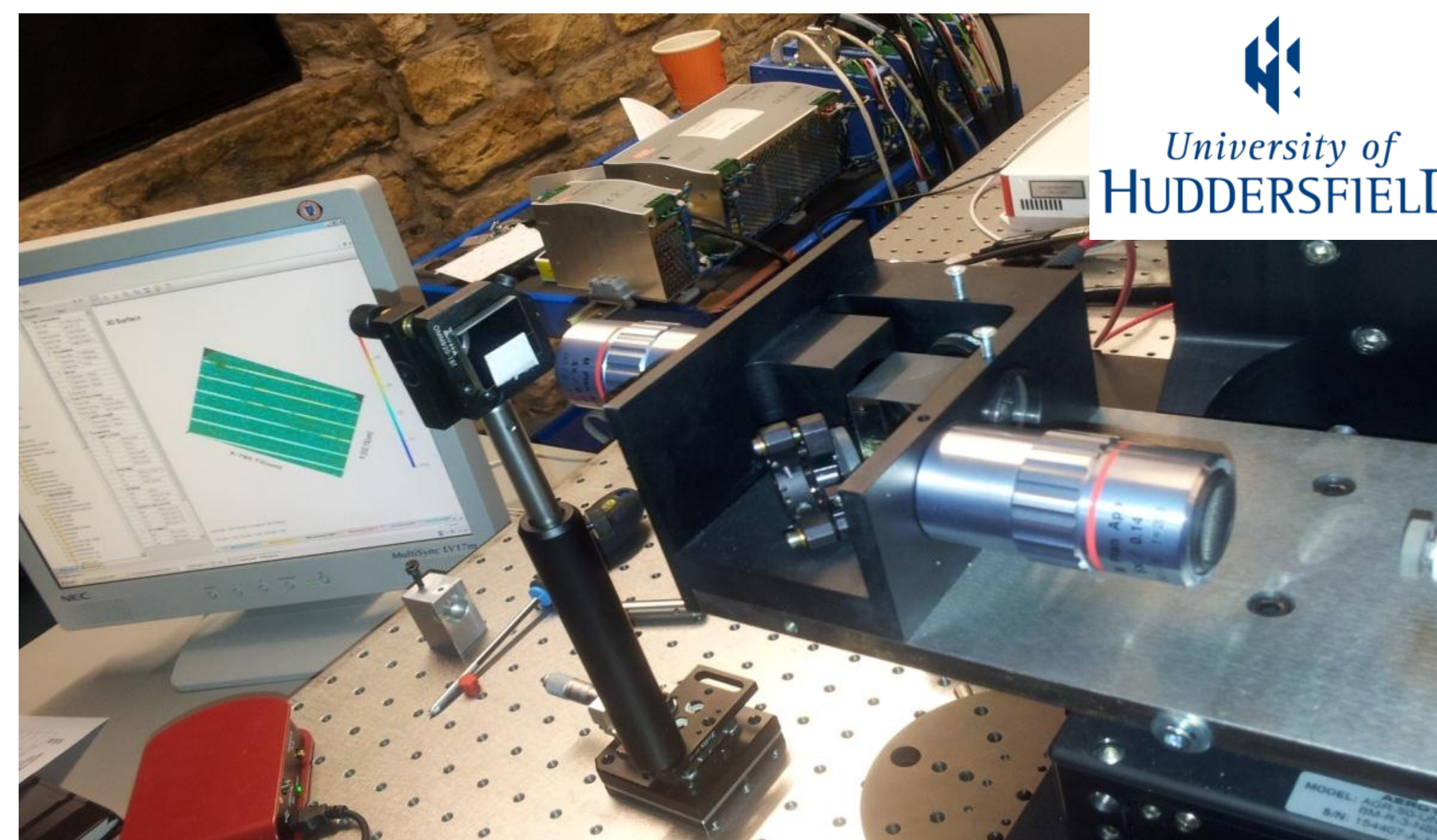


Challenge

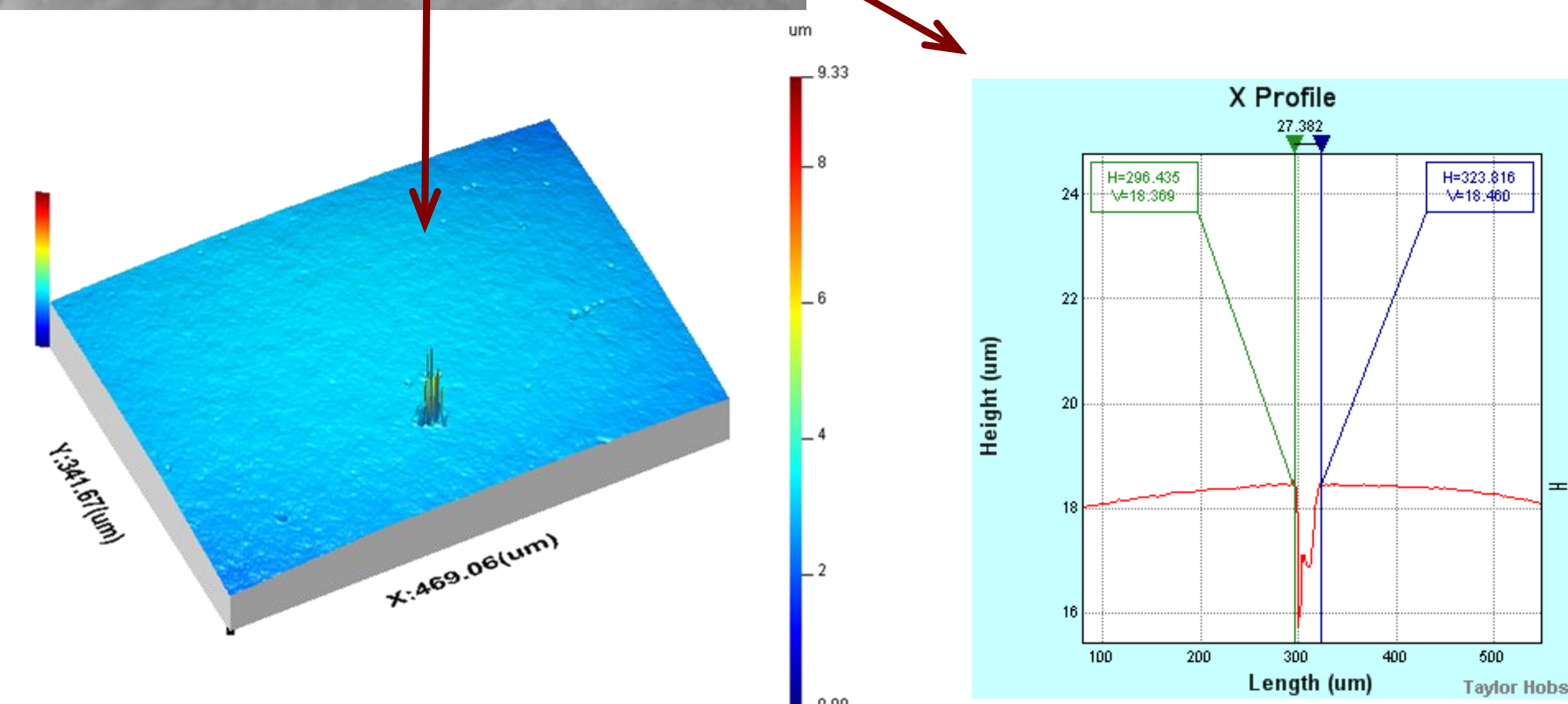
- Defect detection in roll-to-roll vapour barrier layers for flexible photo-voltaic (PV) cells based on active Copper indium gallium selenide (CIGS) technology.
- 40 – 100 nm thick layer of Al_2O_3 deposited onto polymer using atomic layer deposition (ALD) process.
- Defects in the barrier layer reduce PV cell lifespan as the active layers are compromised.
- Metrology of the generated barrier essential for understanding the process and determining **critical defects**.

Experimental Work: Defect detection and characterisation on film layers.

Static measurements on ALD coated barrier film samples have established the capability of the WSI measure relevant defects.



- 30 μm hole detected in film layer by the WSI.
- Defect topography retrieved and analysed.



On-line inspection of film layers at CPI.

As part of the NanoMend project, the WSI system will be implemented as the sensor technology in a proof-of-concept on-line inspection unit at the UK Catapult - **Centre for Process Innovation (CPI)**. A roll-to-roll re-winder unit will run the coated barrier film (450 mm width) past the WSI sensor. An air-bearing foil handling system in conjunction with the WSI vibration compensation system will enable measurement on the flexible substrate.



System integration is being carried out in collaboration with IBS Precision Engineering.

