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EPITAXIAL GROWTH OF CIGSE LAYERS ON GAP/SI(001) PSEUDO-SUBSTRATE FOR TANDEM CIGSE/SI SOLAR CELLS

Reference: *Solar Energy Materials and Solar Cells 233, 111385, 2021*

Collaborations : IMN, Institut FOTON, UMR-IPVF
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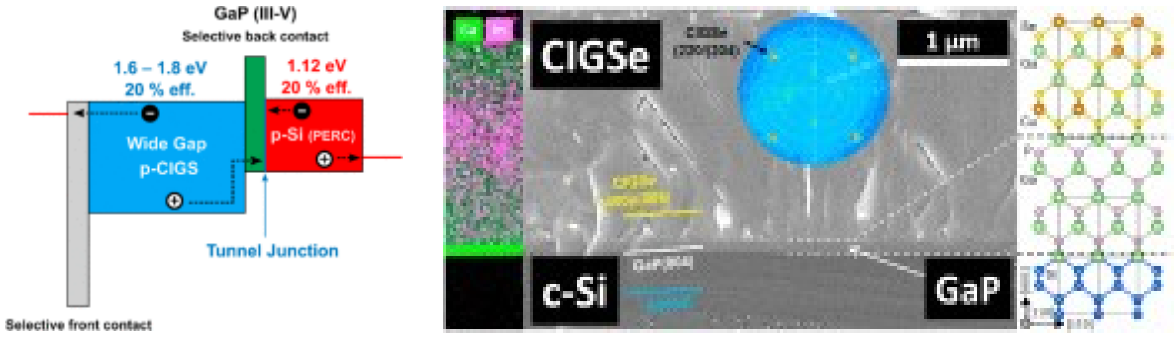
The paper reports on the investigation of the epitaxial growth of co-evaporated Cu(In,Ga)Se_2 films (CIGSe) onto GaP/Si(001) pseudo- substrates, where the GaP thin layer is epitaxially grown by Molecular Beam Epitaxy (MBE). Extensive structural characterization of epi-CIGSe is carried out via X-ray diffraction and transmission electron microscopy. Sturdy evidence of an epitaxial growth of CIGSe on (GaP/Si)(001) is observed, with the propagation of twins originating from the GaP/Si interface, through the CIGSe/GaP interface. This work aims at paving the way for future CIGSe/GaP/Si structures for the development of tandem solar cells with a c-Si bottom cell, and a GaP interfacial buffer layer for band edge engineering, allowing for the monolithic epitaxial growth of high quality CIGSe as a thin film top cell absorber.



Left: Band structure of the targeted tandem device structure
Right: scanning electron microscopy image of c-Si/GaP/CIGSe cross section and main advanced X-Ray diffraction and transmission electron microscopy investigations.