



Contribution ID: 144

Type: Oral

Low energy muon study of the p-n interface in chalcopyrite solar cells

Tuesday, 30 August 2022 11:50 (20 minutes)

The slow muons technique provides a quantitative approach to characterize the effect of various cover layers on the passivation of bulk defects near the p-n junction of solar cells 1.

Several cover layers on top of the chalcopyrite Cu(In,Ga)Se₂ (CIGS) semiconductor absorber were investigated in this work, namely CdS, ZnSnO, Al₂O₃ and SiO₂.

The figure shows the depth profile of a measurement on a CdS/CIGS sample. The diamagnetic fraction is used as an indication of the perturbation of the lattice at the site of the muon. The lower part of the figure shows the model depth profile obtained after deconvolution of the experimental data with the range distribution function. The dip in the diamagnetic fraction near the interface indicates that the lattice is more perturbed in this near-interface region than further inward in the sample. We find that CdS provides the best defect passivation; the oxide materials are less effective.

1 Alberto, H.V. et al. "Characterization of the interfacial defect layer in chalcopyrite solar cells by depth resolved muon spin spectroscopy", accepted for publication in *Advanced Materials Interface*, 2022.

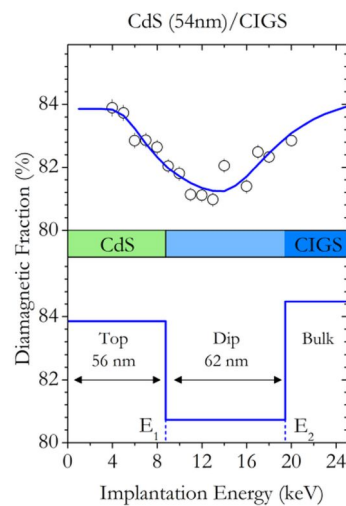


Figure 1: Depth profile of the diamagnetic fraction for CdS/CIGS. The lower part displays the model function used in the fit.

Primary author: VIEIRA ALBERTO, Helena (University of Coimbra, Portugal)

Co-authors: VILAO, Rui (CFisUC, Department of Physics, University of Coimbra); RIBEIRO, Eduardo; Dr GIL, Joao (CFisUC, Department of Physics, University of Coimbra); Mr CURADO, Marco (International Iberian Nanotechnology Laboratory, 4715-330 Braga, Portugal); Dr TEIXEIRA, Jennifer (International Iberian Nanotechnology Laboratory, 4715-330 Braga, Portugal); Dr FERNANDES, Paulo (International Iberian Nanotechnology Laboratory, 4715-330 Braga, Portugal); Mr CUNHA, Jose (International Iberian Nanotechnology Laboratory, 4715-330 Braga, Portugal); Dr SALOME, Pedro (International Iberian Nanotechnology Laboratory, 4715-330 Braga, Portugal); Prof. EDOFF, Marika (Ångström Laboratory, Solid State Electronics, Ångström Solar Center, Uppsala University, SE-75121 Uppsala, Sweden); Ms MARTINS, Maria (Laboratory for Muon Spin Spectroscopy, Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland); Dr PROKSCHA, Thomas (PSI); Dr SALMAN, Zaher (Paul Scherrer Institute); WEIDINGER, Alois (privat)

Presenter: VIEIRA ALBERTO, Helena (University of Coimbra, Portugal)

Session Classification: Oral contributions

Track Classification: Energy materials