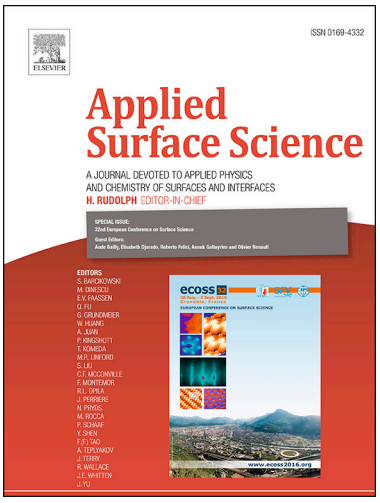

Full Length Article

$Cu(In,Ga)Se_2$ surface treatment with Na and NaF: A combined photoelectron spectroscopy and surface photovoltage study in ultra-high vacuum

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PII: S0169-4332(18)30674-3
DOI: https://doi.org/10.1016/j.apsusc.2018.03.014
Reference: APSUSC 38762

To appear in: *Applied Surface Science*

Received Date: 24 October 2017
Revised Date: 28 February 2018
Accepted Date: 2 March 2018

Please cite this article as: V. Parvan, A. Mizrak, I. Majumdar, B. Ümsür, W. Calvet, D. Greiner, C.A. Kaufmann, T. Dittrich, E. Avancini, I. Lauermann, $Cu(In,Ga)Se_2$ surface treatment with Na and NaF: A combined photoelectron spectroscopy and surface photovoltage study in ultra-high vacuum, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.03.014

$Cu(In,Ga)Se_2$ surface treatment with Na and NaF: A combined photoelectron spectroscopy and surface photovoltage study in ultra-high vacuum

V. Parvan[1], A. Mizrak[1], I. Majumdar[1], B. Ümsür[1], W. Calvet[1,a)], D. Greiner[1], C. A. Kaufmann[1], T. Dittrich[2,b)], E. Avancini[1,c)] I. Lauermann[1,d)]

[1] *PVcomB, Helmholtz-Zentrum Berlin für Materialien and Energie GmbH, Schwarzschildstr. 3, 12489 Berlin, Germany*

[2] *Institut für Siliziumphotovoltaik, Helmholtz-Zentrum Berlin für Materialien and Energie GmbH, Kekuléstr. 5, 12489 Berlin, Germany*

Abstract

Either metallic Na or NaF were deposited onto $Cu(In,Ga)Se_2$ surfaces and studied by photoelectron spectroscopy and surface photovoltage spectroscopy without breaking the ultra-high vacuum. The deposition of elemental Na at room temperature led to the formation of an intermediate Cu and Ga rich layer at the CIGSe surface, whereas for NaF the composition of the CIGSe surface remained unchanged. A metal like surface induced by an inverted near surface region with a reduced number of defect states was formed after the deposition of Na. Under the chosen experimental conditions, the near surface layer was independent on the amount of Na and stable in time. In contrast, the usage of NaF weakened the inversion and led to an increased band bending compared to the untreated CIGSe sample. The SPV signals decreased with proceeding time after the deposition of NaF.

Keywords: CIGSe, photovoltaic, XPS, SPV, sodium, thin films

a) Email: wolfram.calvet@helmholtz-berlin.de

b) Email: dittrich@helmholtz-berlin.de

c) Current address: EMPA, Überlandstr. 129, CH-8600 Dübendorf, Switzerland

d) Email: iver.lauermann@helmholtz-berlin.de