

Programme Solaire Photovoltaïque

2006 edition

Project title	BBCIGSE : Broad Band gap CIGSe Solar Cells
Summary	<p>Cu(In,Ga)Se₂ (CIGSe) based solar cells presently reach conversion efficiencies close to 20% (actual record 19,5 %) and about ten research teams throughout the world regularly achieve cells with conversion efficiencies above 15%. Considering the ensemble of the devices achieved by the international scientific community it appears that when trying to increase the band gap of CuInSe₂ (CISe) by a partial replacement of indium by gallium (Cu(In,Ga)Se₂ or CIGSe), by aluminium (Cu(In,Al)Se₂ or CIASe), or by a partial substitution of the selenium sites by sulphur (CuIn(S,Se)₂ or CISSe), the resulting solar cell show maximal conversion efficiencies for absorbers comprised between 1,1 and 1,2 eV. A generic and solely optical argument (i.e. without considerations of current evacuation) concludes that the maximal efficiency should occur between 1,4 and 1,5 eV. The present inability to produce quality wide gap absorbers is a major drawback for the realization of high efficiency devices. The search for absorbers from the CISe (CIGSe, CIASe, CISSe, ...) family with optimal gaps for single junctions, or couples of optimal gaps for tandem structures must solve the same problem : the present limitation to the realization of high conversion efficiency devices (> 20%) using wide band gap absorbers, between 1,4 and 1,7 eV.</p>
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