Local structural studies on CIGS thin-film solar cells

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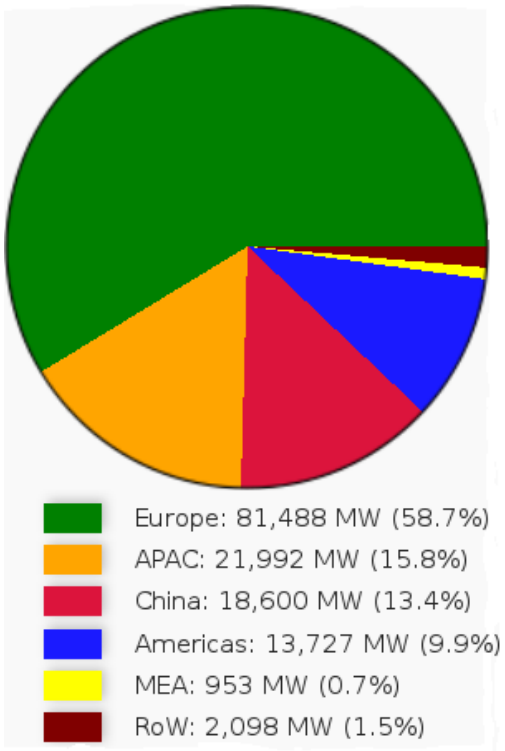
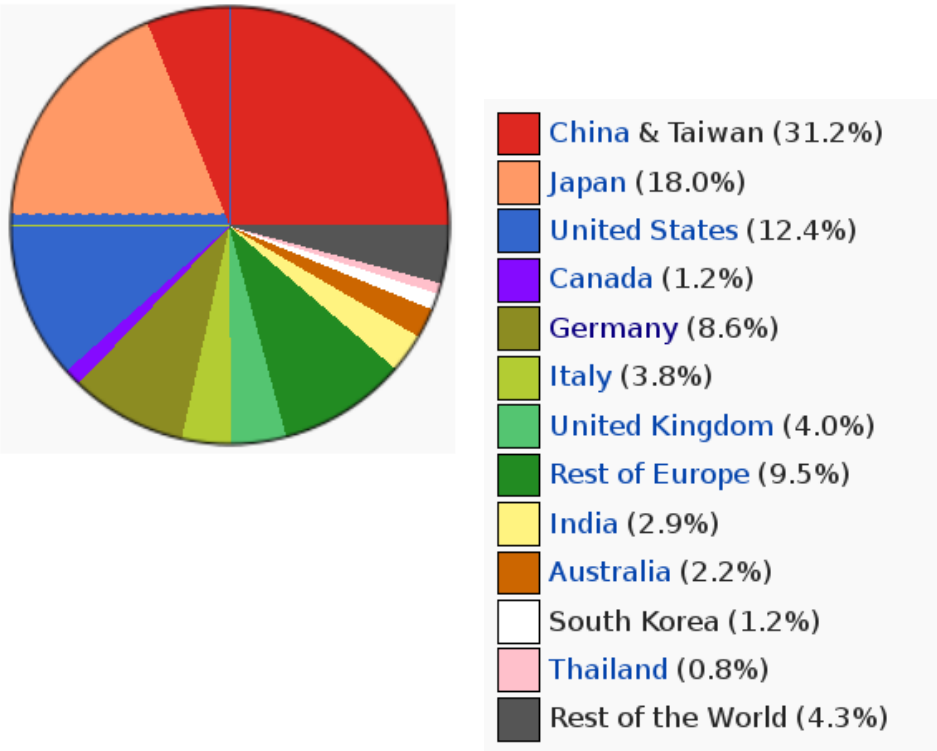
The current slides are a replacement for the slides at the talk because of proprietay content.

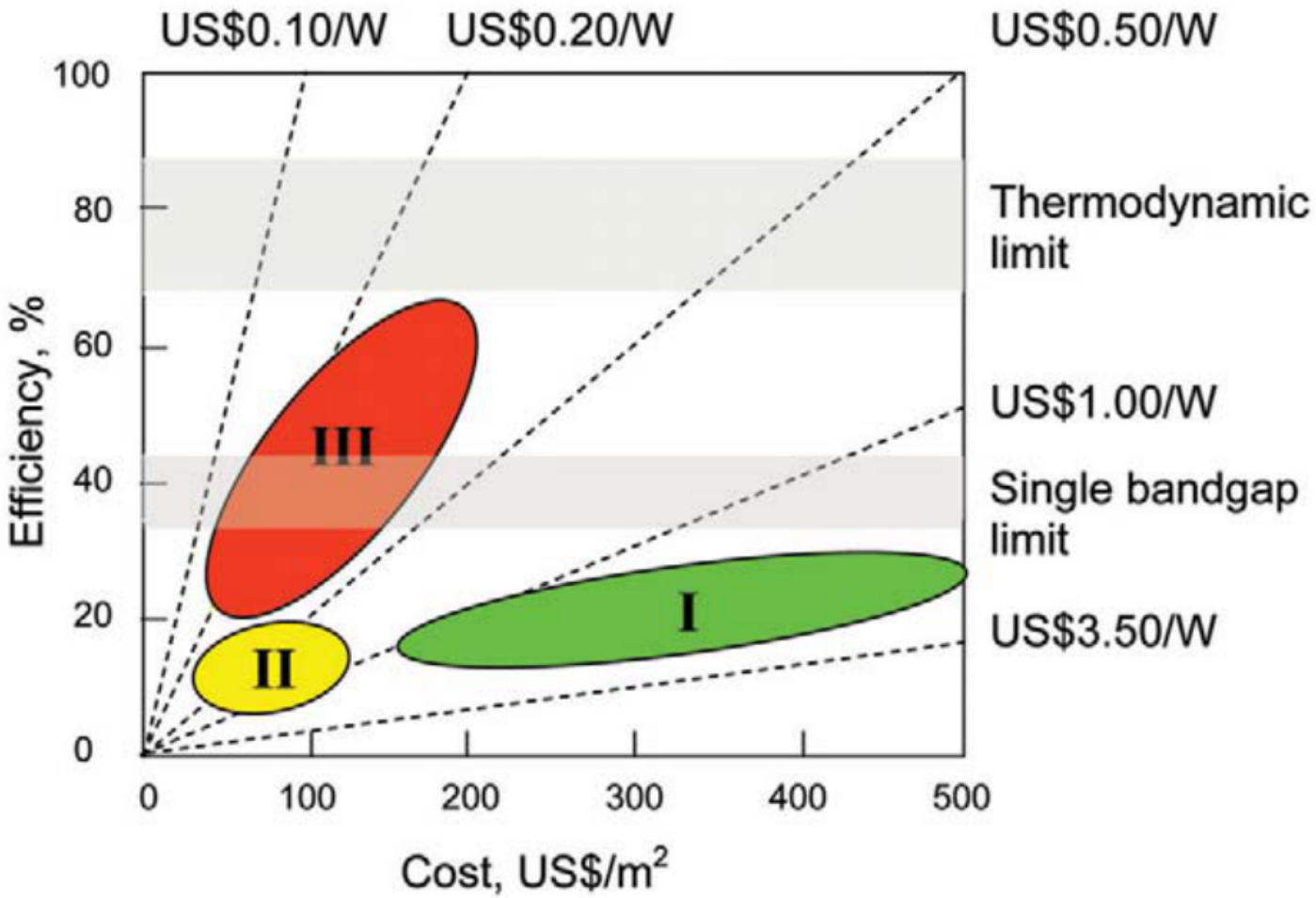
Global Installed and Added Capacity 2013





Source: Wikipedia

Generations of Solar Cells



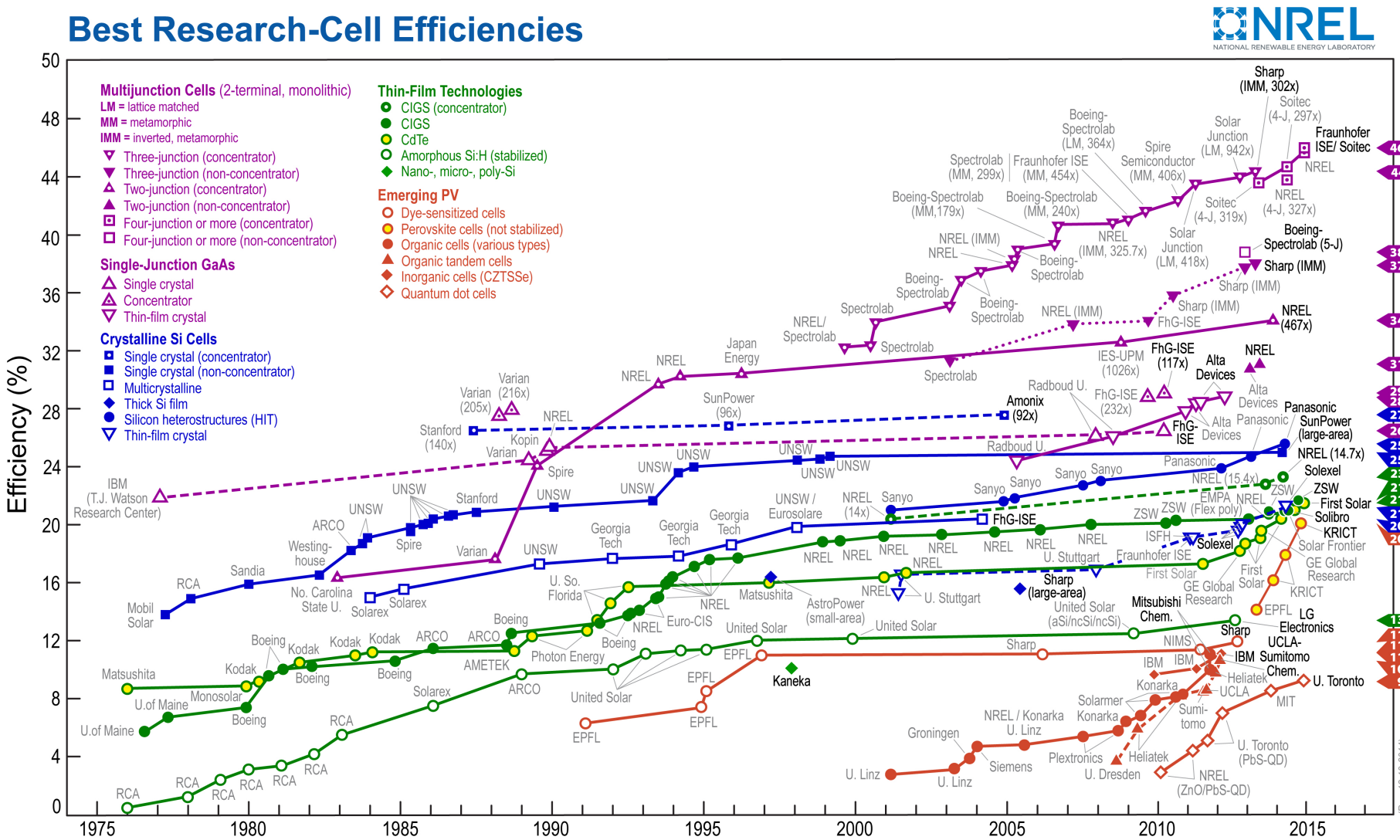
generations: I) wafer , II) films, III advanced thin films/multijunction

Lit: G. Conibeer: Third-generation photovoltaics. MaterialsToday 20 (2007) 42

Thin Film Solar Cells

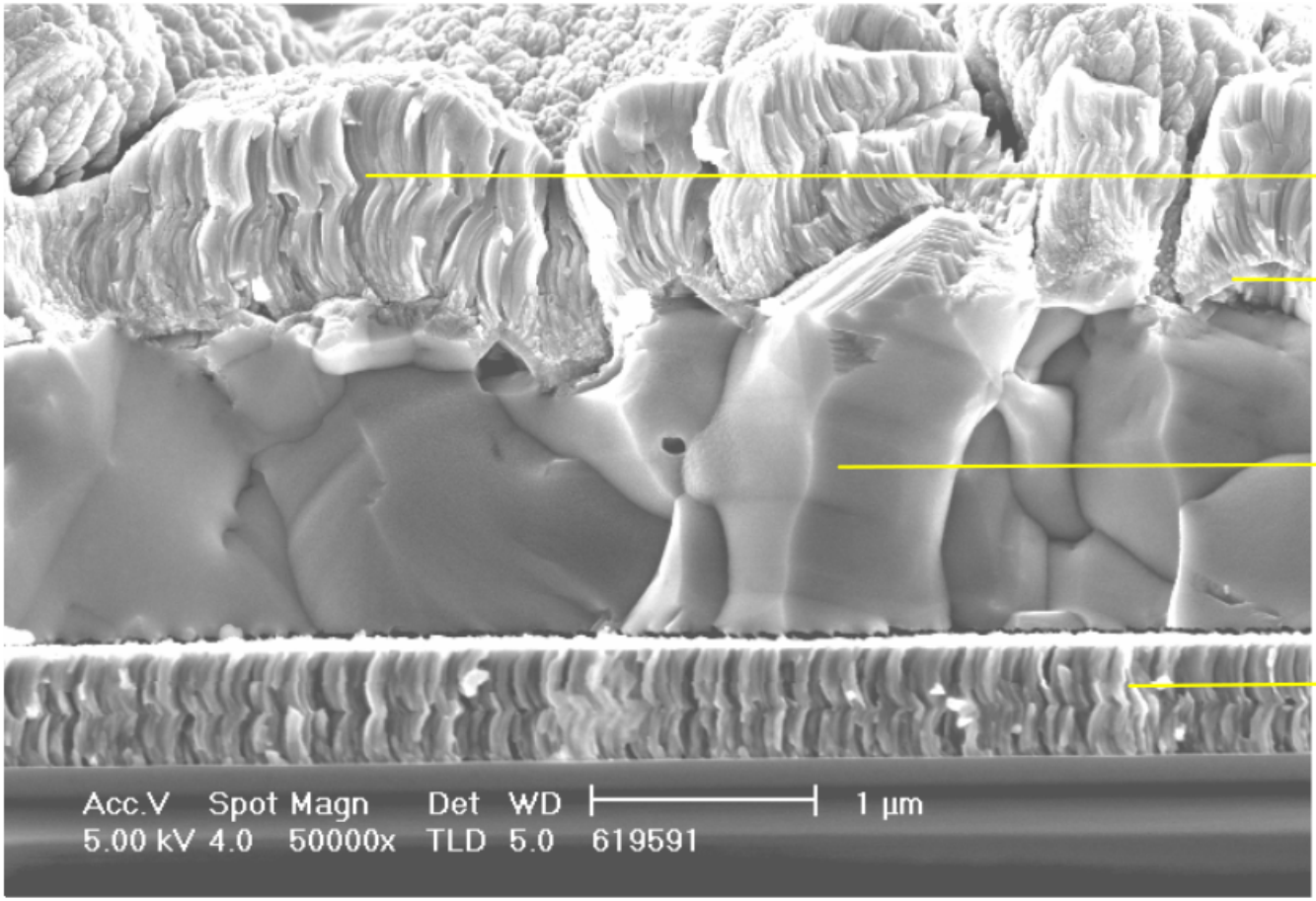
Uni-Solar Ovonic thin film flexible PV
Picture: Fieldsken Ken Fields

Solar Cell Efficiencies



Source: www.nrel.gov

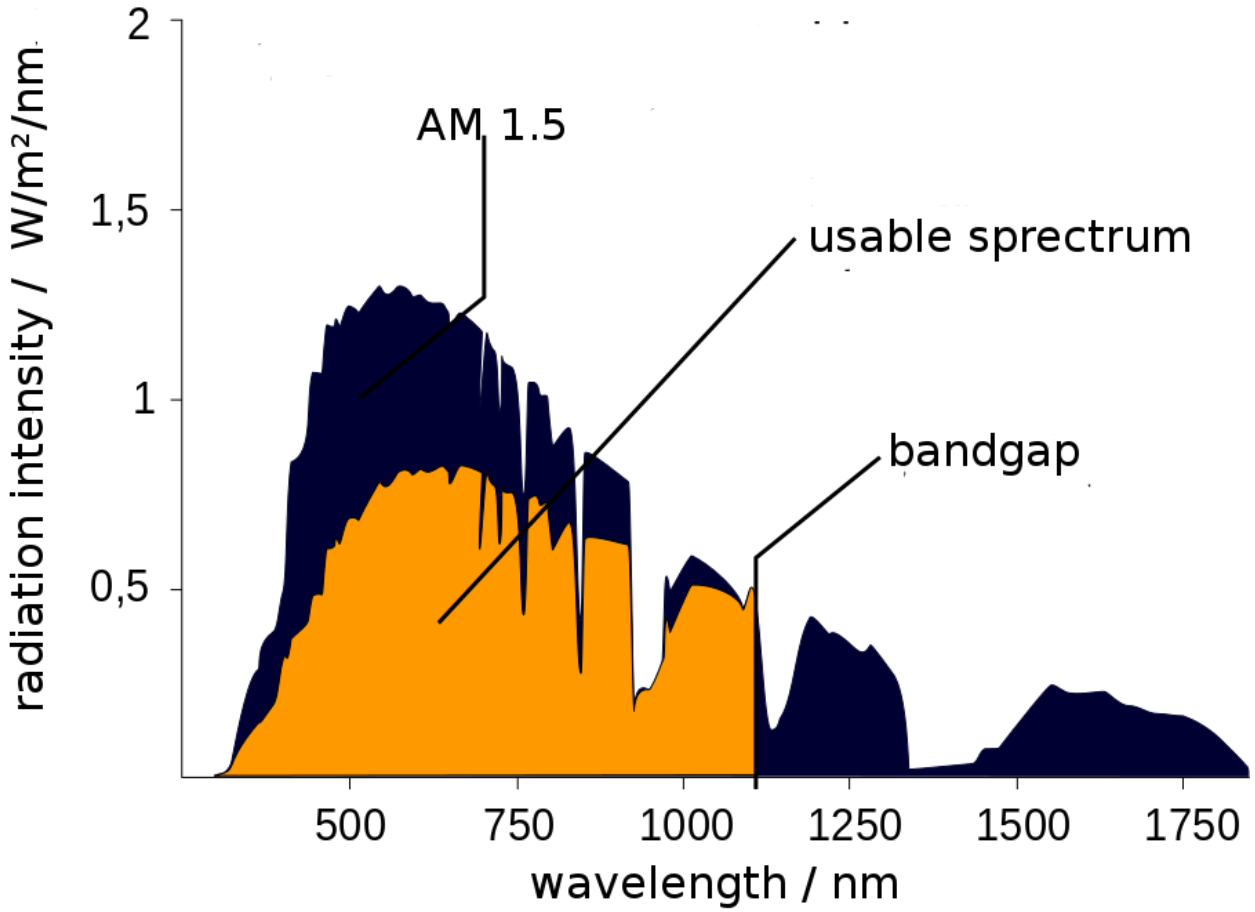
CIGS: Copper Indium Gallium Selenide Solar Cell



CdS buffer layer: performance increase. Why?

Source: www.zsw-bw.de

Tunable Bandgap

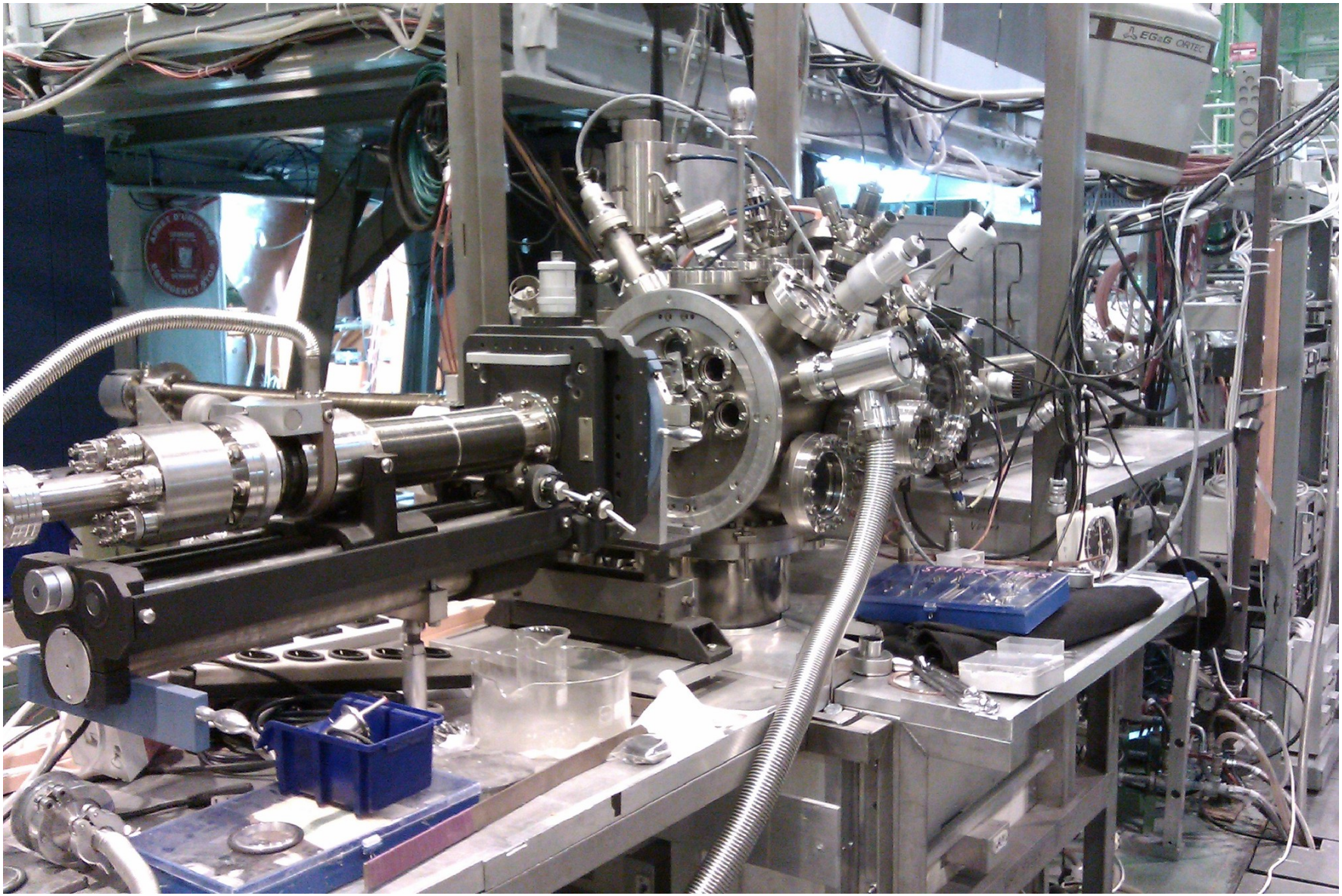


$Cu(Ga,In)Se_2$: tunable bandgap by varying the Ga/In ratio

Source Wikipedia

ASPIC

Apparatus for **S**urface **P**hysics and **I**nterfaces at **C**ERN



Proposal Goals

P	$T_{1/2}$	F1	SL	Spin	Q	μ	A_{22}
^{111}In	2.8 d	^{111}Cd	84.5 ns	5/2+	0.77	-0.7656	-0.178
^{111m}Cd	2.8 d	^{111}Cd	84.5 ns	5/2+	0.77	-0.7656	-0.178

- study of the buffer layer effect of increasing the performance
- perturbed angular correlation can provide information of the local structure at/near the buffer layer/CIGS interface
- ideal case for studies on good performing PAC isotops 111mCd and 111In
- basic studies on the $CuGaSe_2$ and $CuInSe_2$ will be performed
- clean surface studies using ASPIC vs. air exposed studies
- procedures on ASPIC can be trained with ^{111}In before using ^{111m}Cd (time and performance optimization)
- **8 shifts: ^{111m}Cd**

Collaboration

- Wolfram Witte: Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW), Stuttgard, Germany
- Torben Esmann Mølholt, ISOLDE/CERN, Geneve Switzerland
- Jens Röder: RWTH-Aachen, Aachen, Germany and ISOLDE/CERN, Geneve, Switzerland,
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