

Integrated Solar Systems Solutions in Smart Buildings

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Dr. Walid Issa
EIT Programme Leader



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ECT - affiliated to the well-established Engineering Institute of Technology (EIT) - is an engineering education specialist. ECT delivers bachelor's and master's degrees.



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We deliver our programmes via a unique delivery methodology that makes use of live and interactive tutorials, an international pool of expert lecturers, dedicated learning support officers, hands-on workshops and state-of-the-art remote labs connected to real equipment, and simulation software.

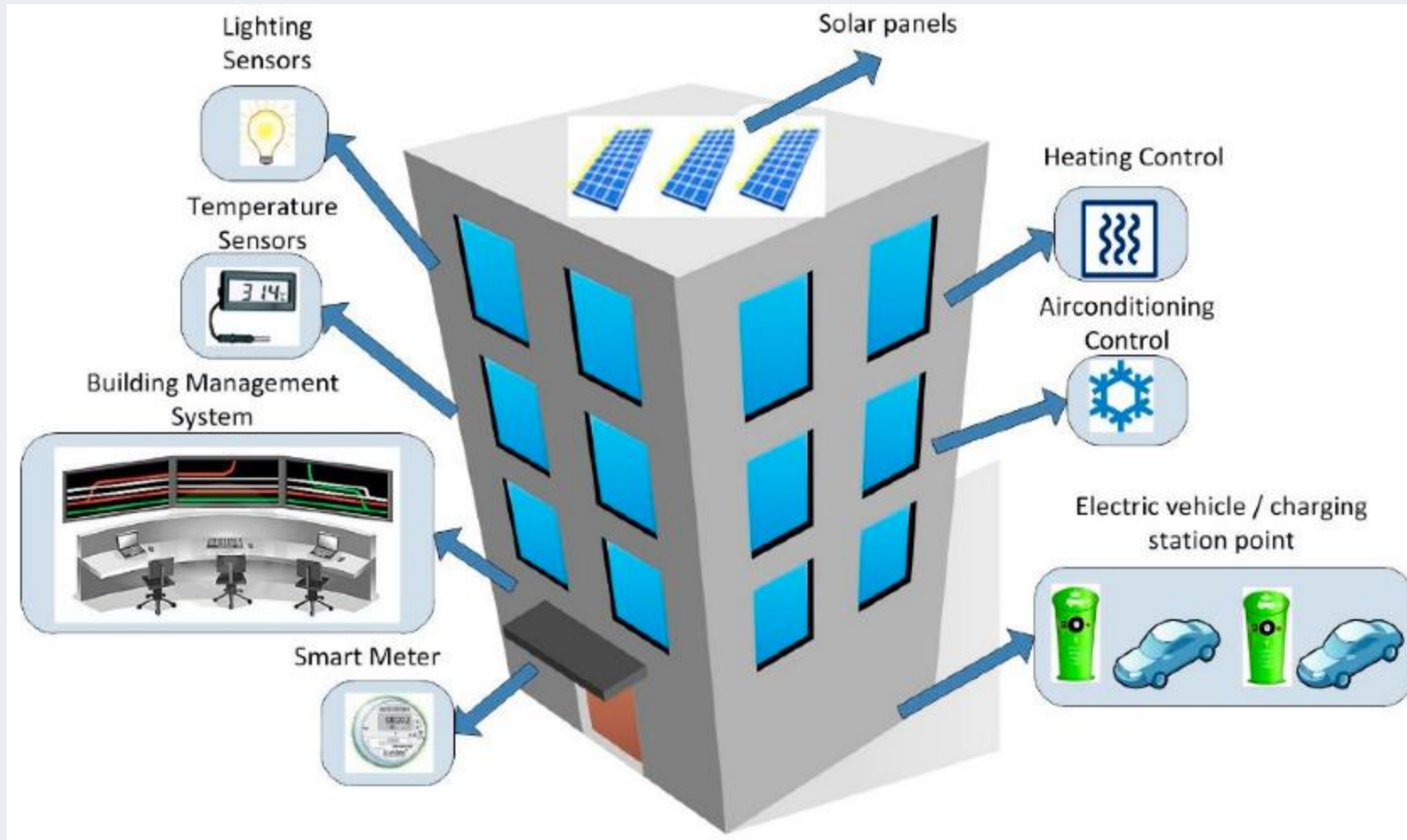
Introduction – Presenter

Walid Issa

- Dr Walid Issa received his PhD in Renewable Energy from University of Exeter, 2015
- Served in higher Education at different universities for 10 years
- Leading the program of Electrical Engineering
- His main research interests include power electronics, digital control, DC/AC and DC/DC converters and their applications microgrids, EV and smart buildings.

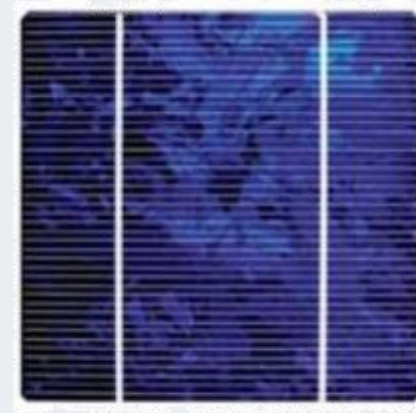


Integrated Solar Systems Solutions in Smart Buildings





(a)



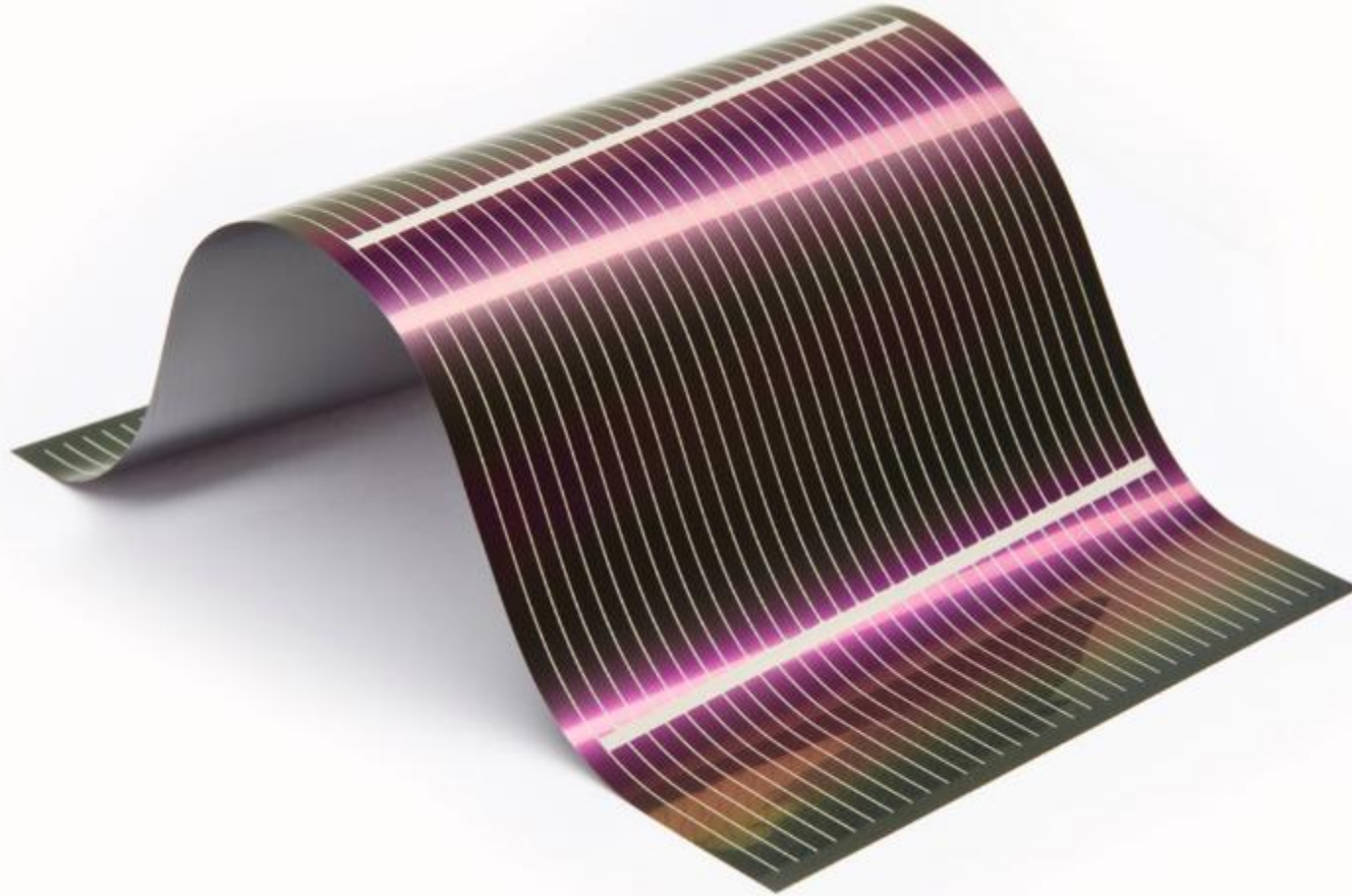
(b)

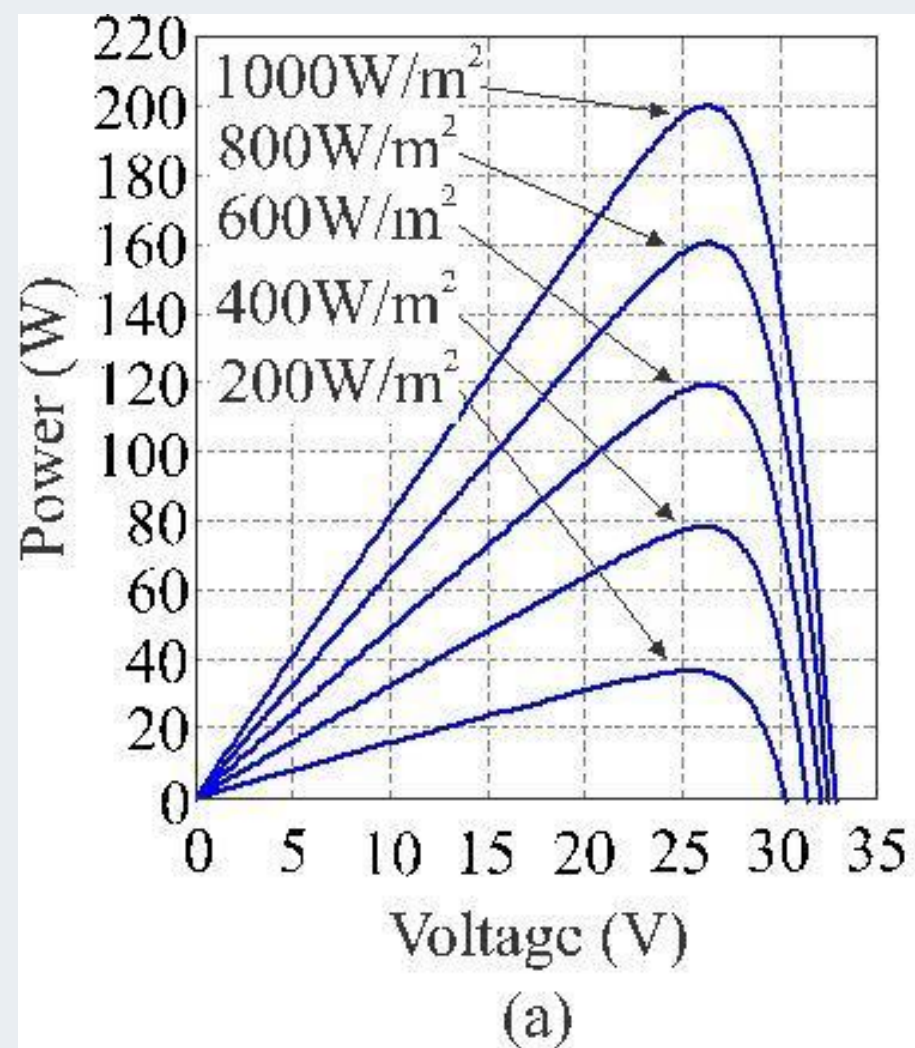
The two main silicon solar cell types: (a) monocrystalline silicon (a) and polycrystalline silicon (b)

Thin Film

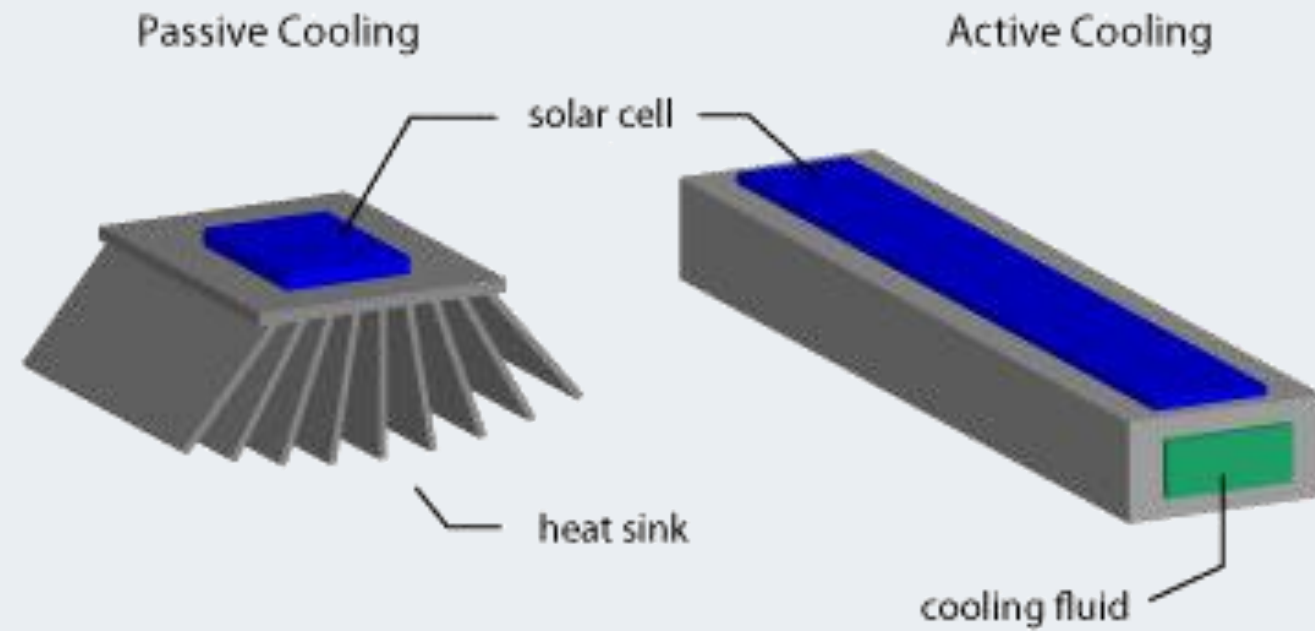


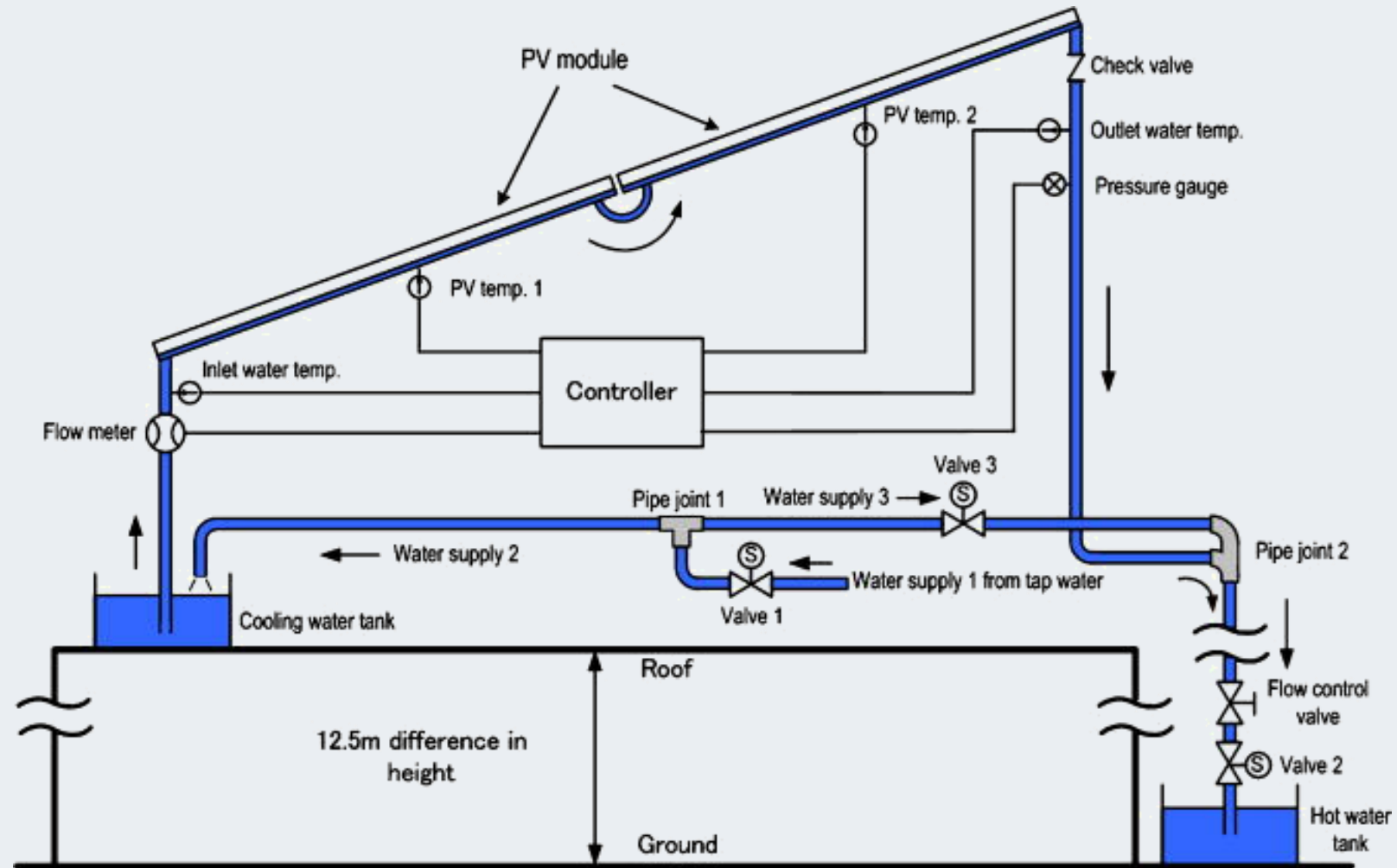
Thin Film

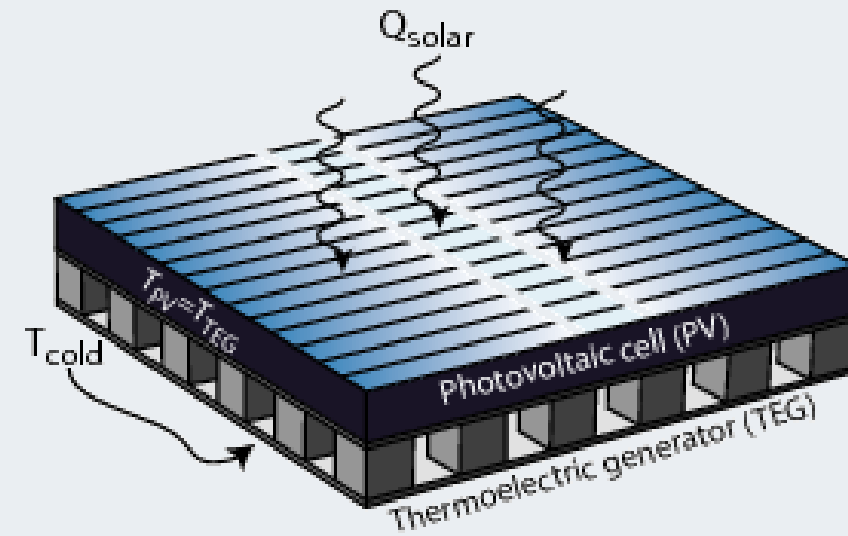
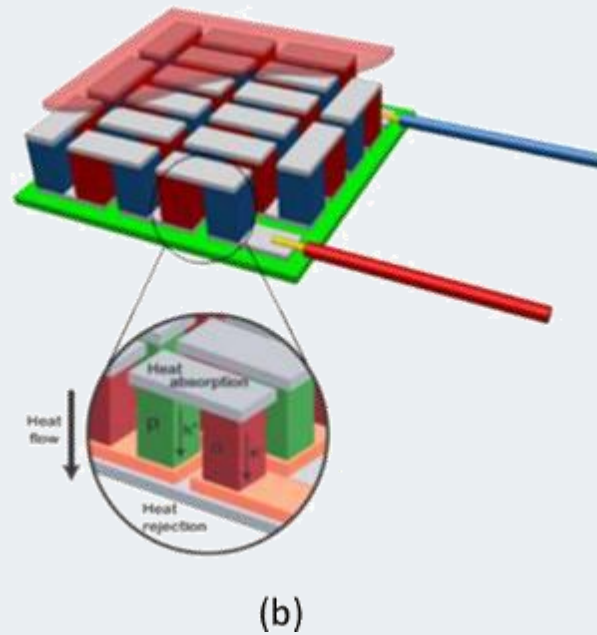
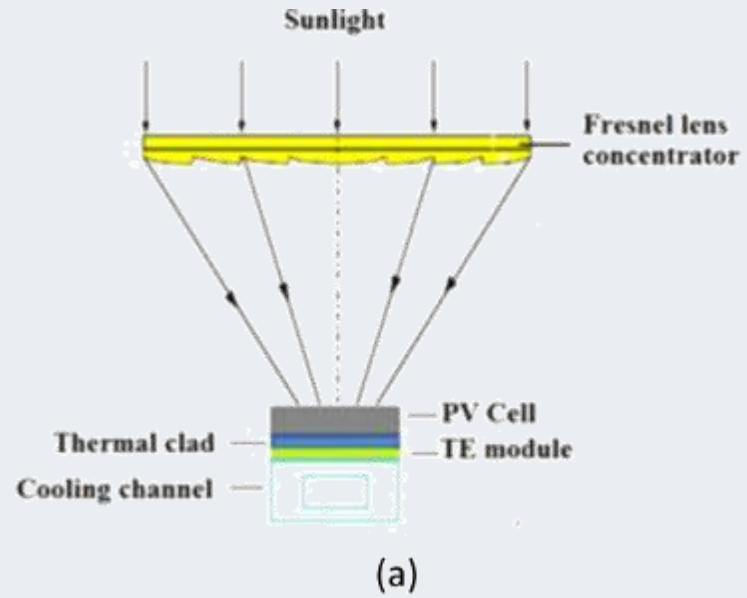




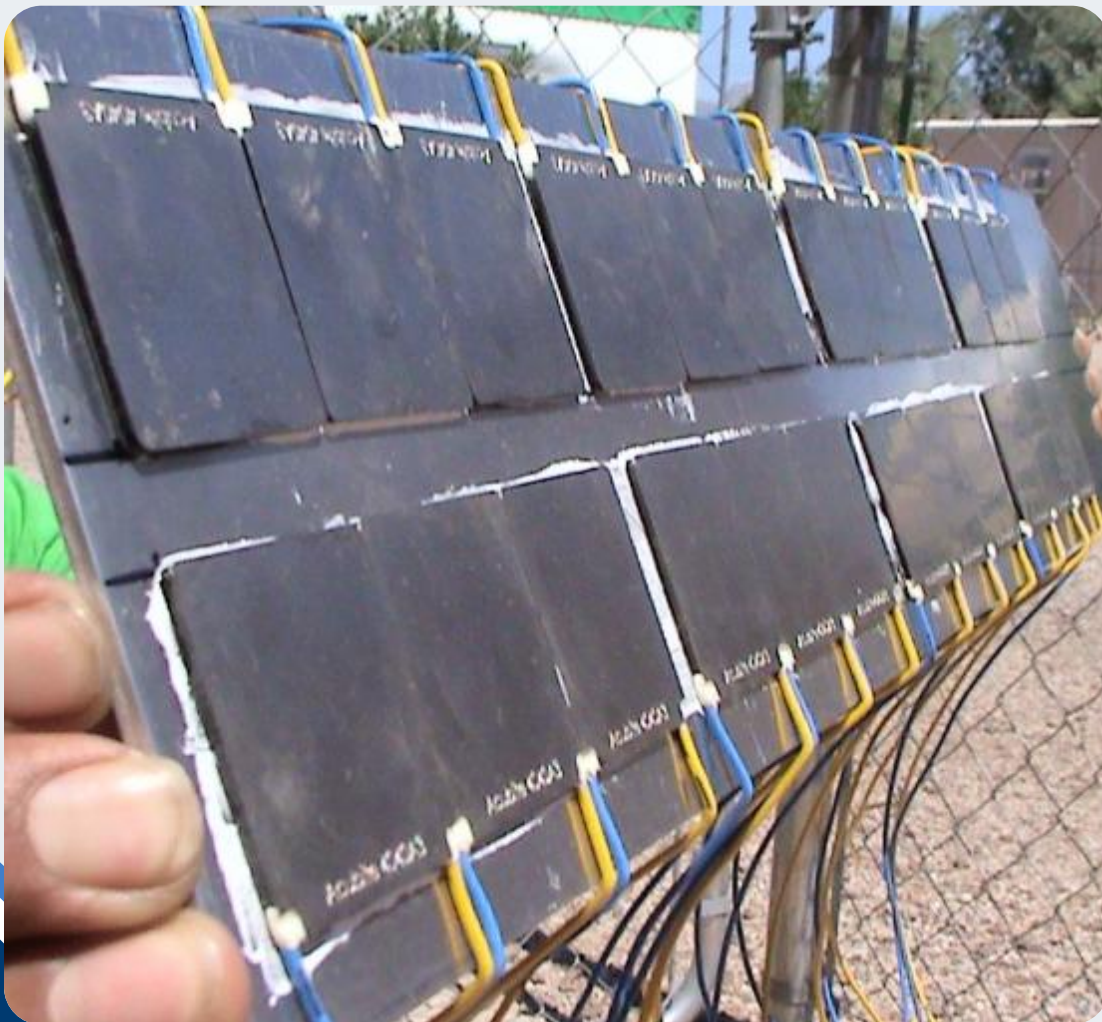
Cooling



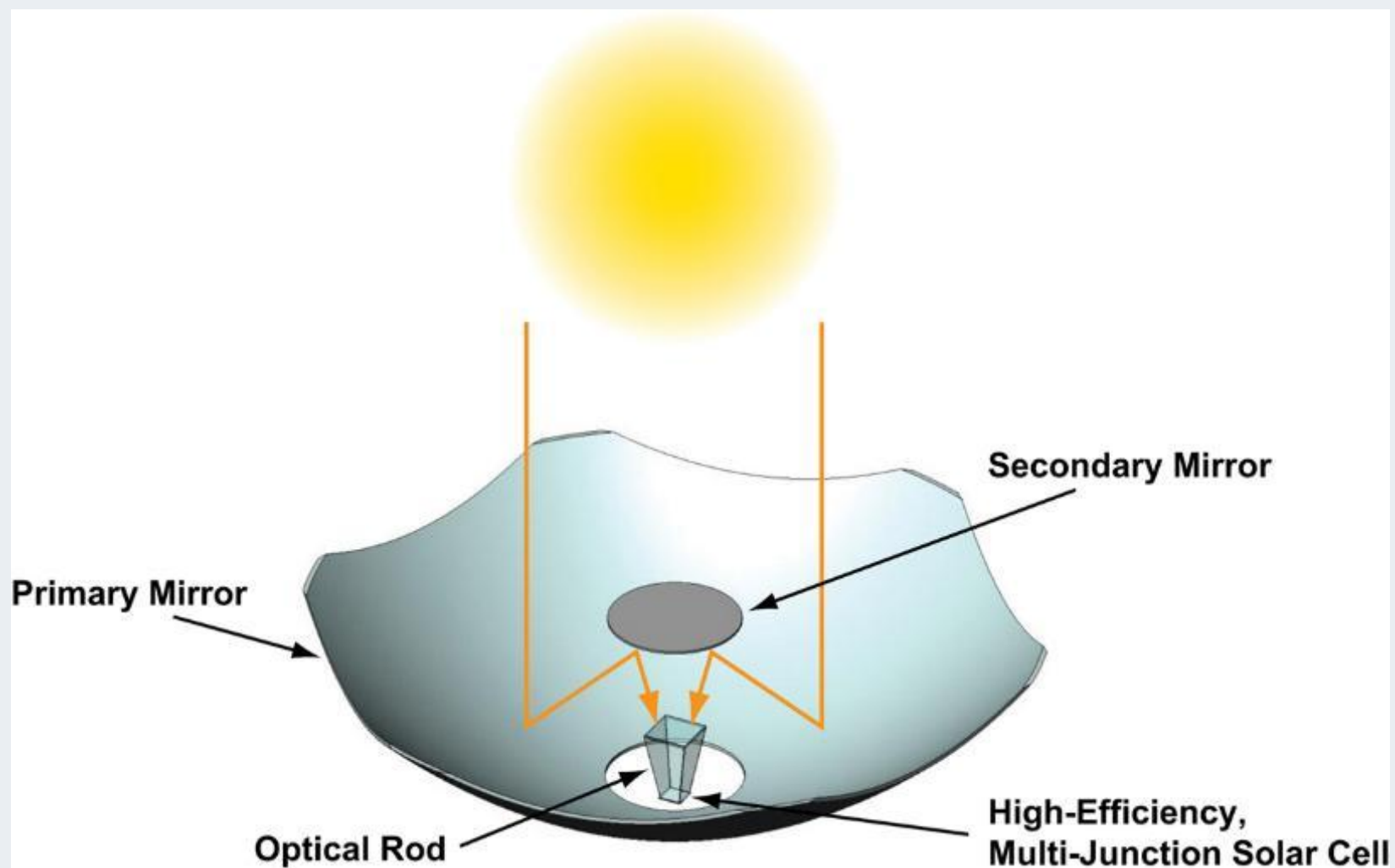




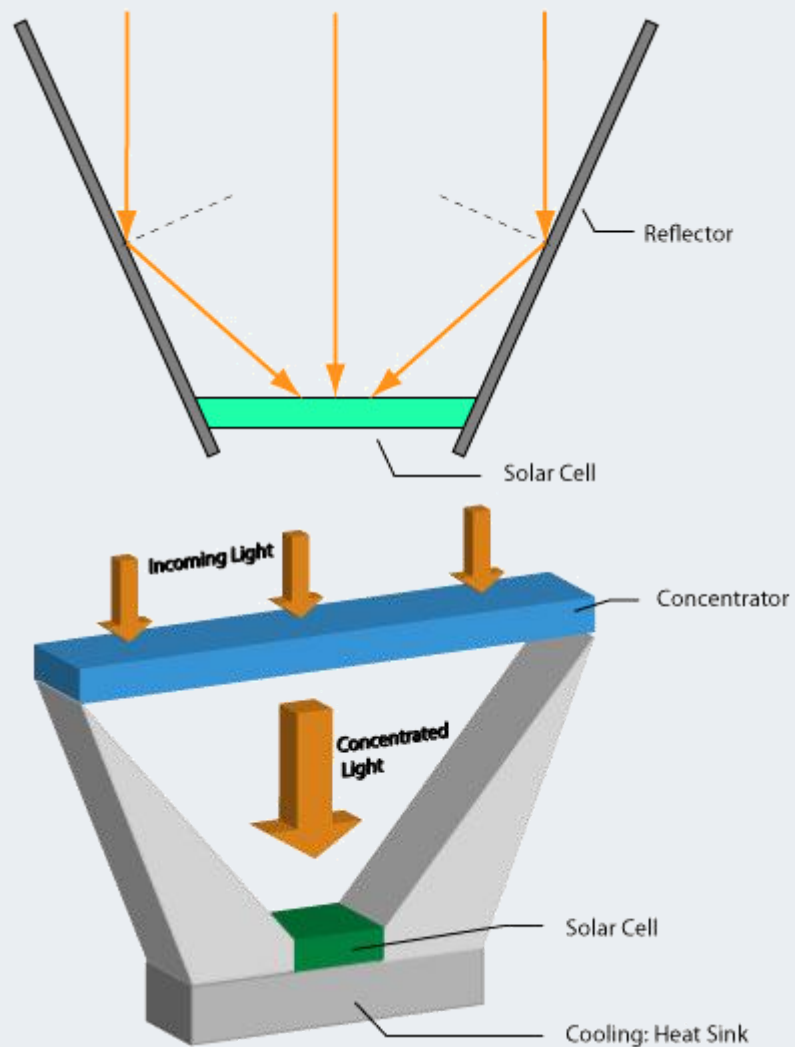
Peltier



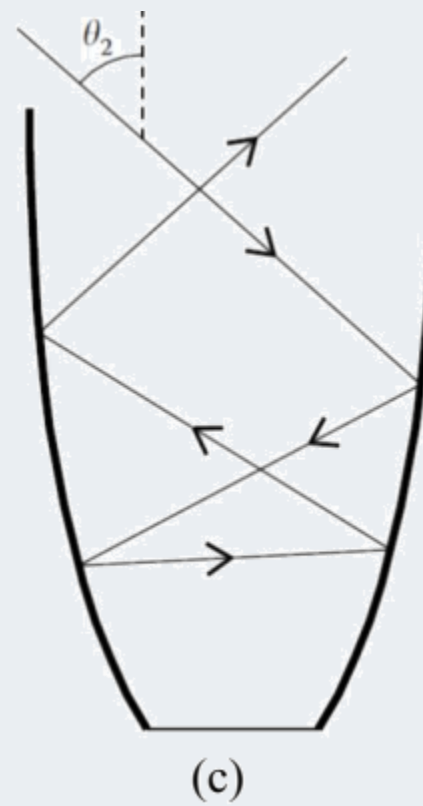
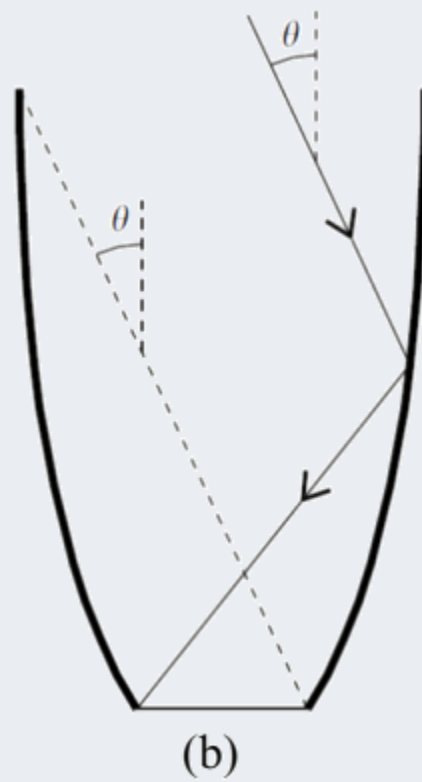
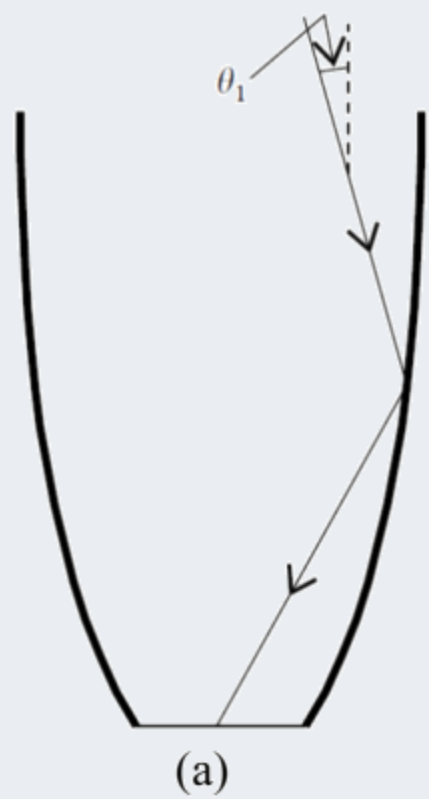


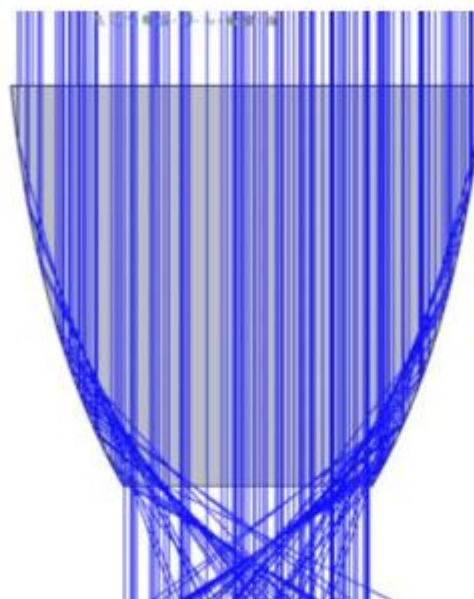




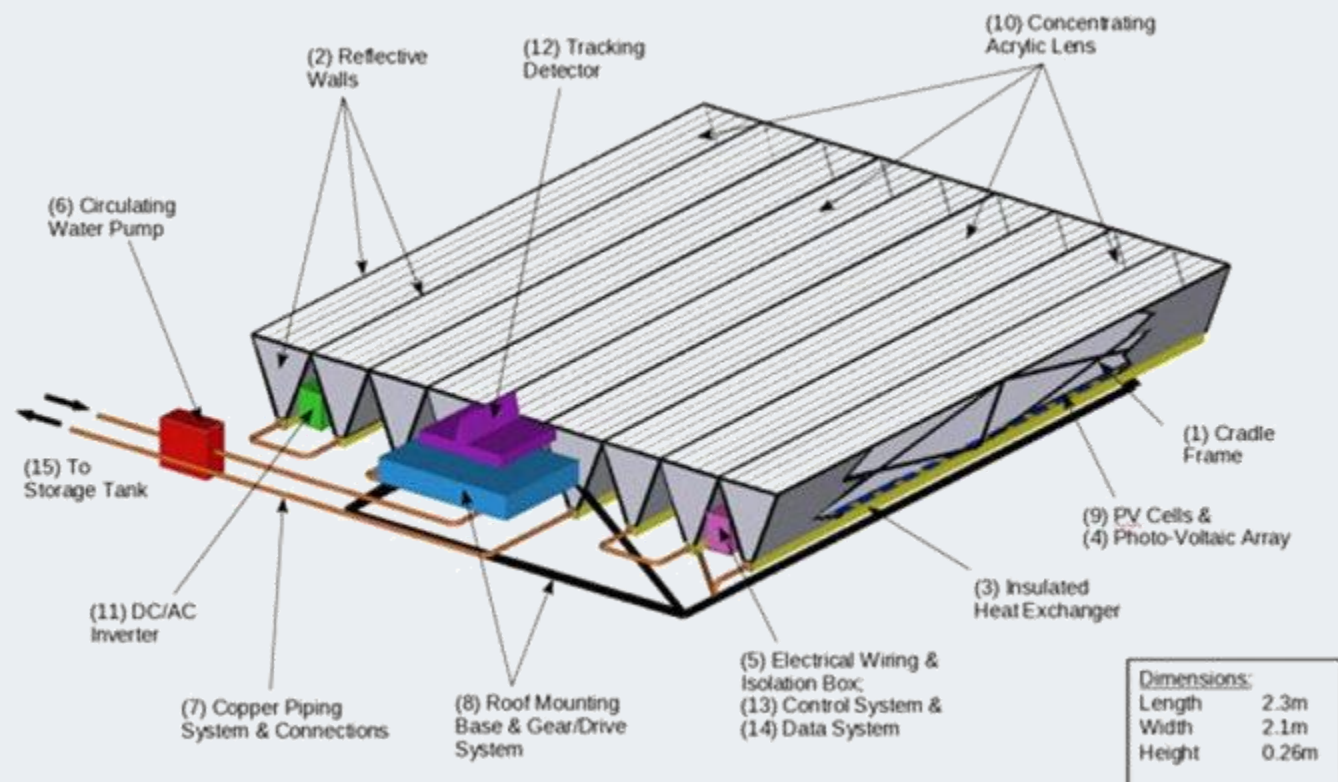


CPV



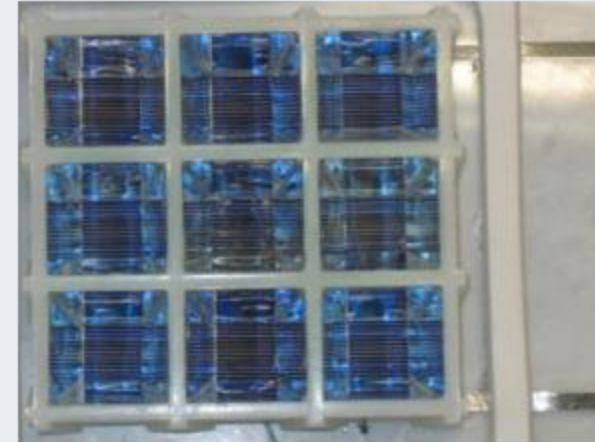


Path of concentrated incident rays obtained from the reflective CCPC
illustrated by OptisWorks





(a)



(b)

Figure 2.21: (a) Experimental model of CCPC covered with reflective film; (b) concentrating cells (designed to operate at <10 suns) assembly with CCPCs



Figure 2.38: Part A and Part B of the polyurethane material

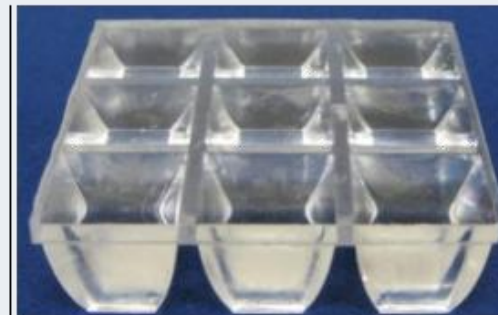
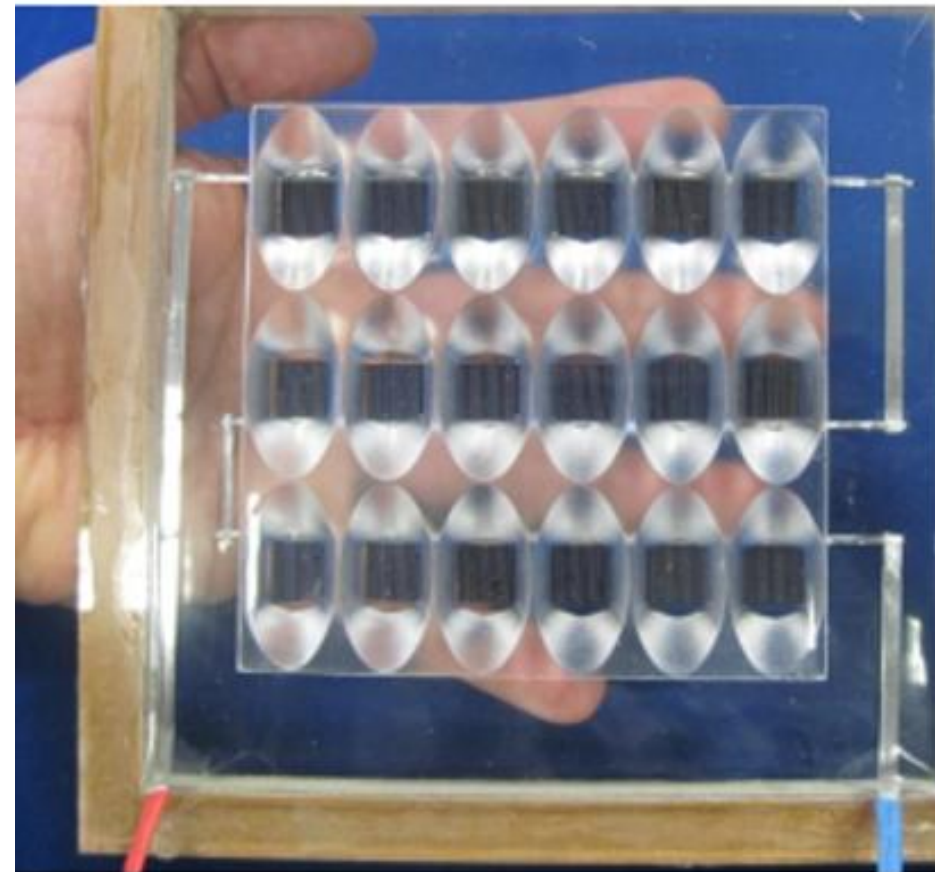
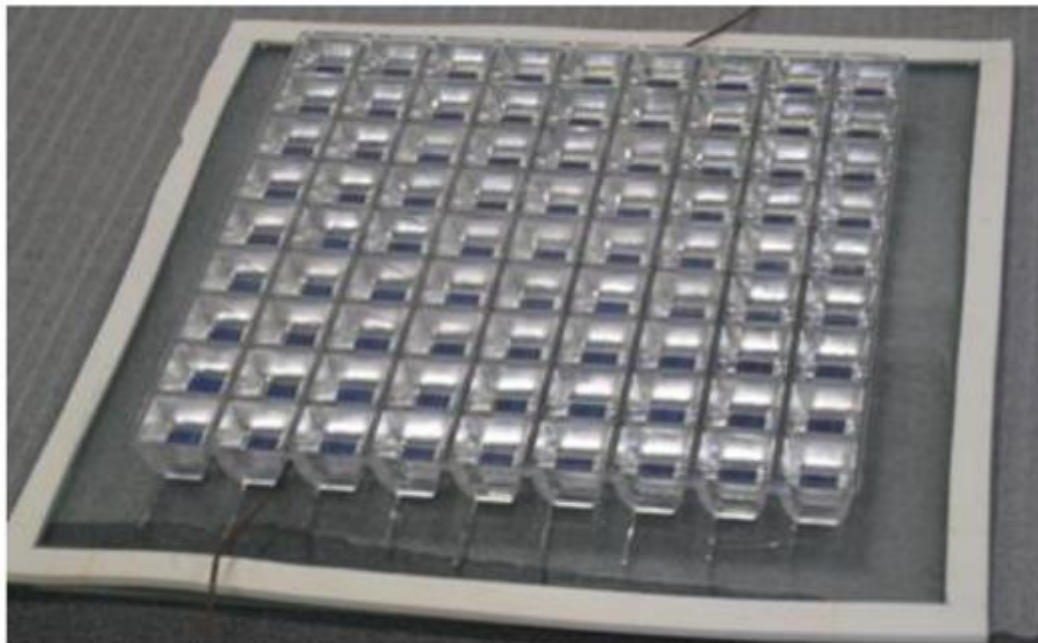
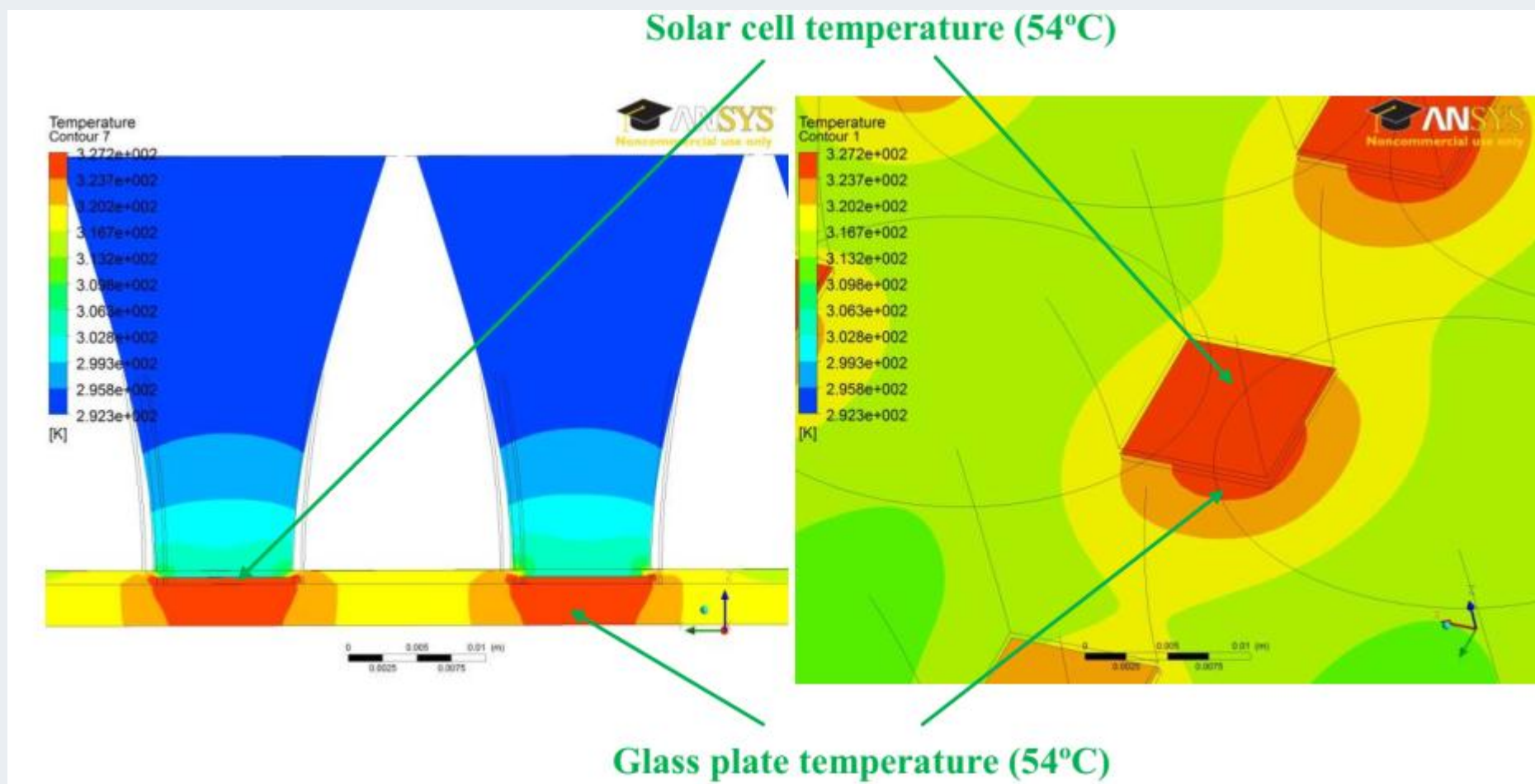
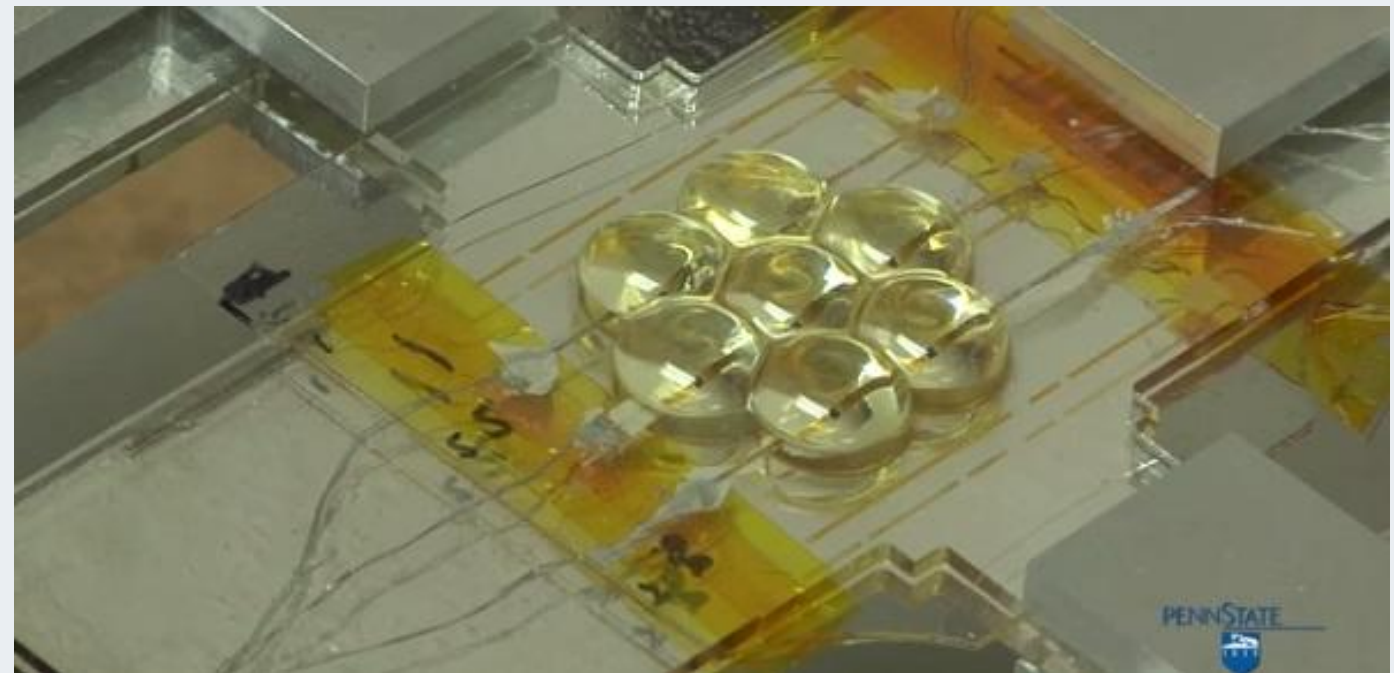
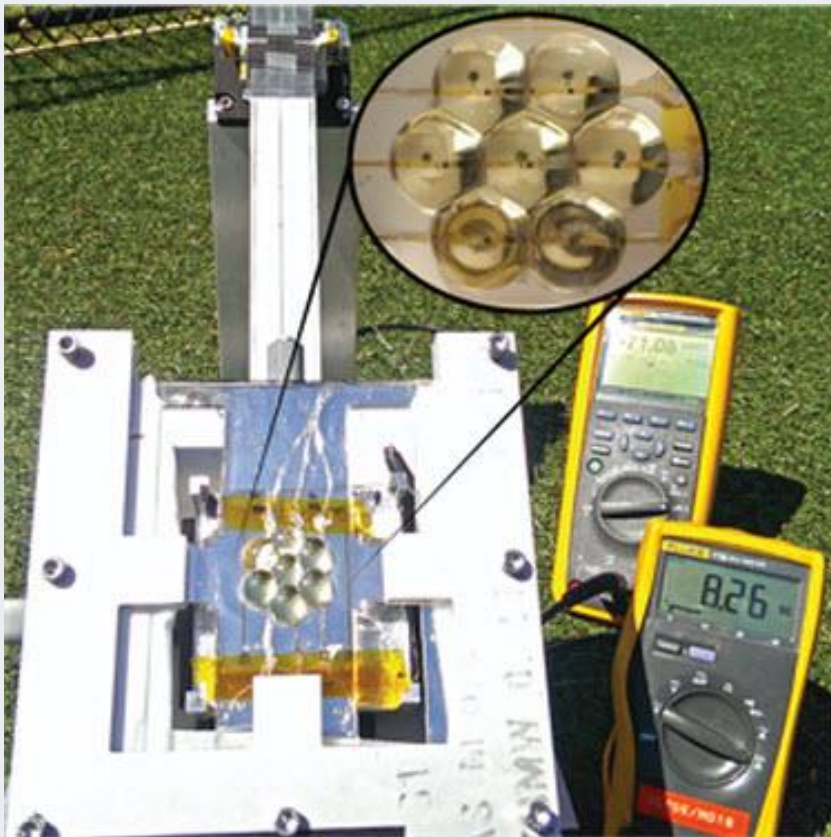


Figure 2.39: Example of casted refractive CCPC







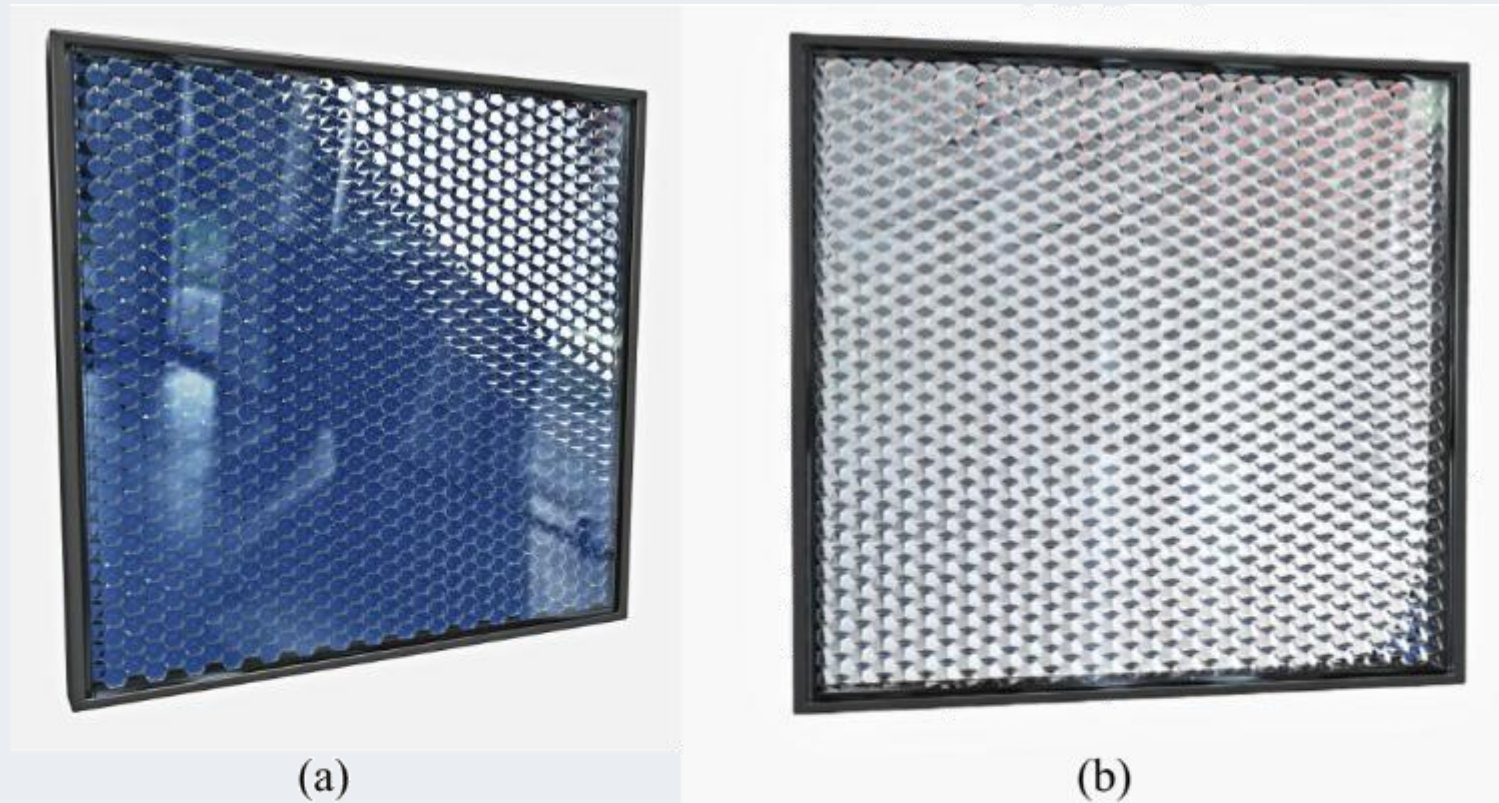
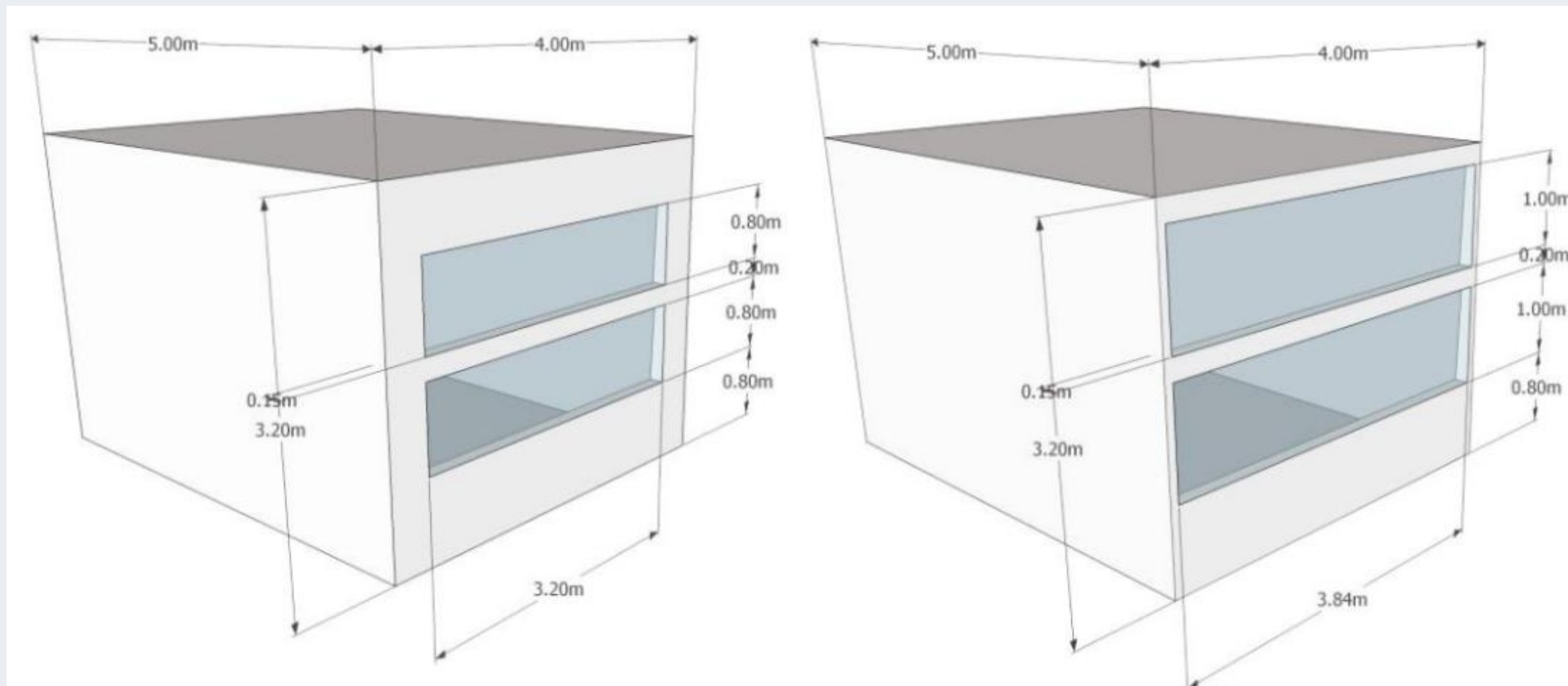


Figure 1.29: BeeHive PV, view from: (a) inside the building and (b) outside the building [148]



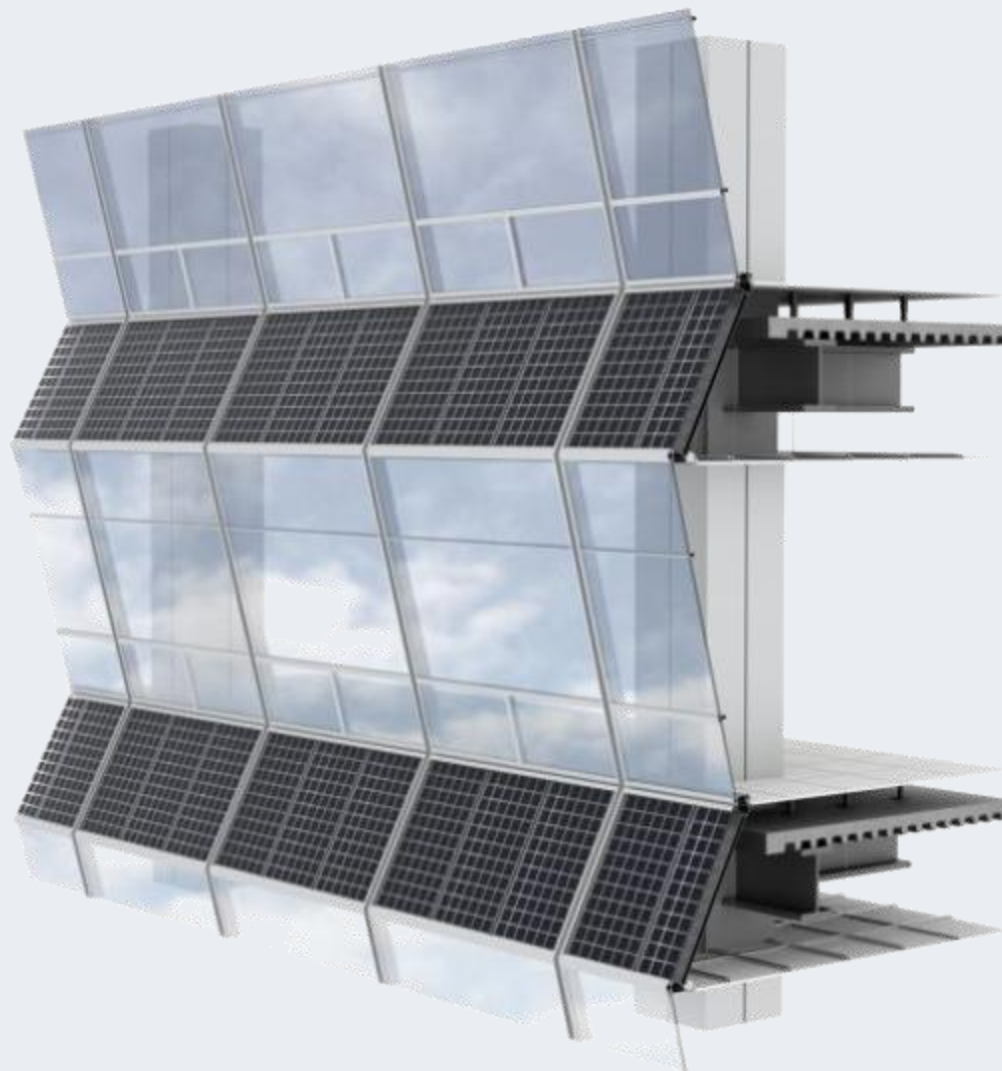
Façade Buildings

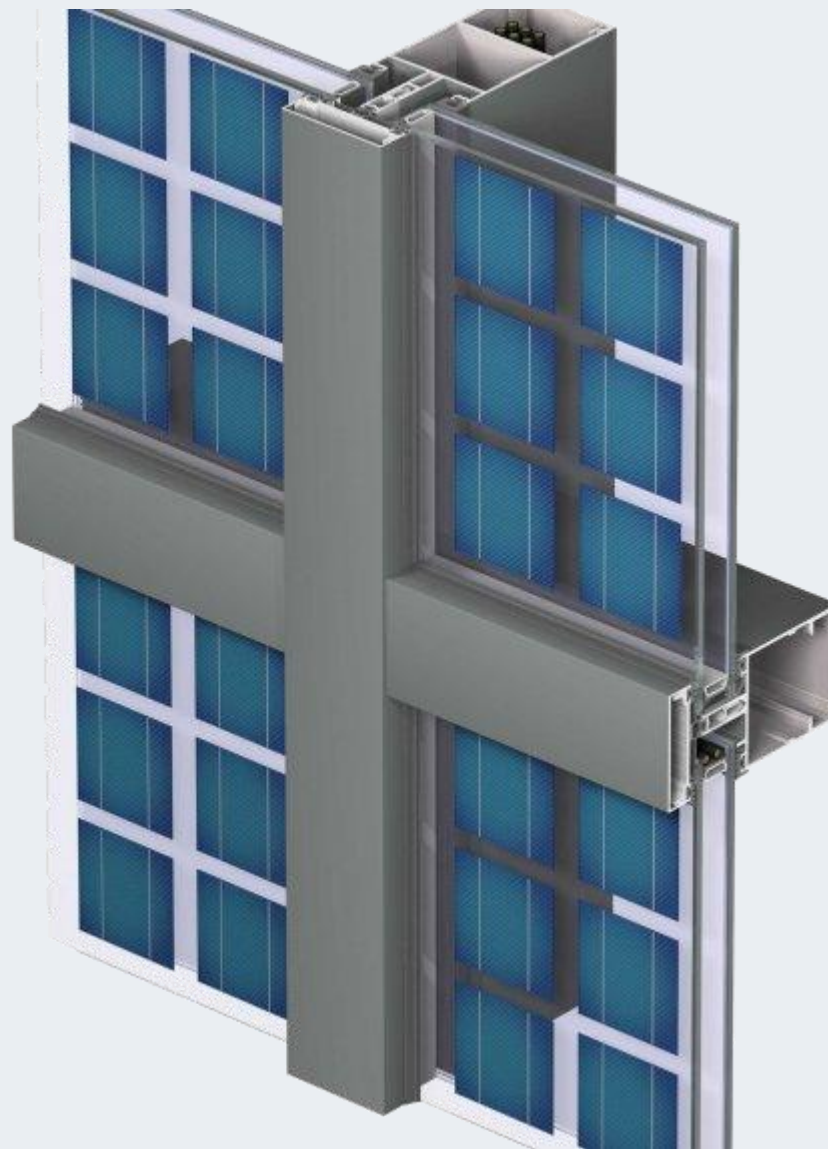


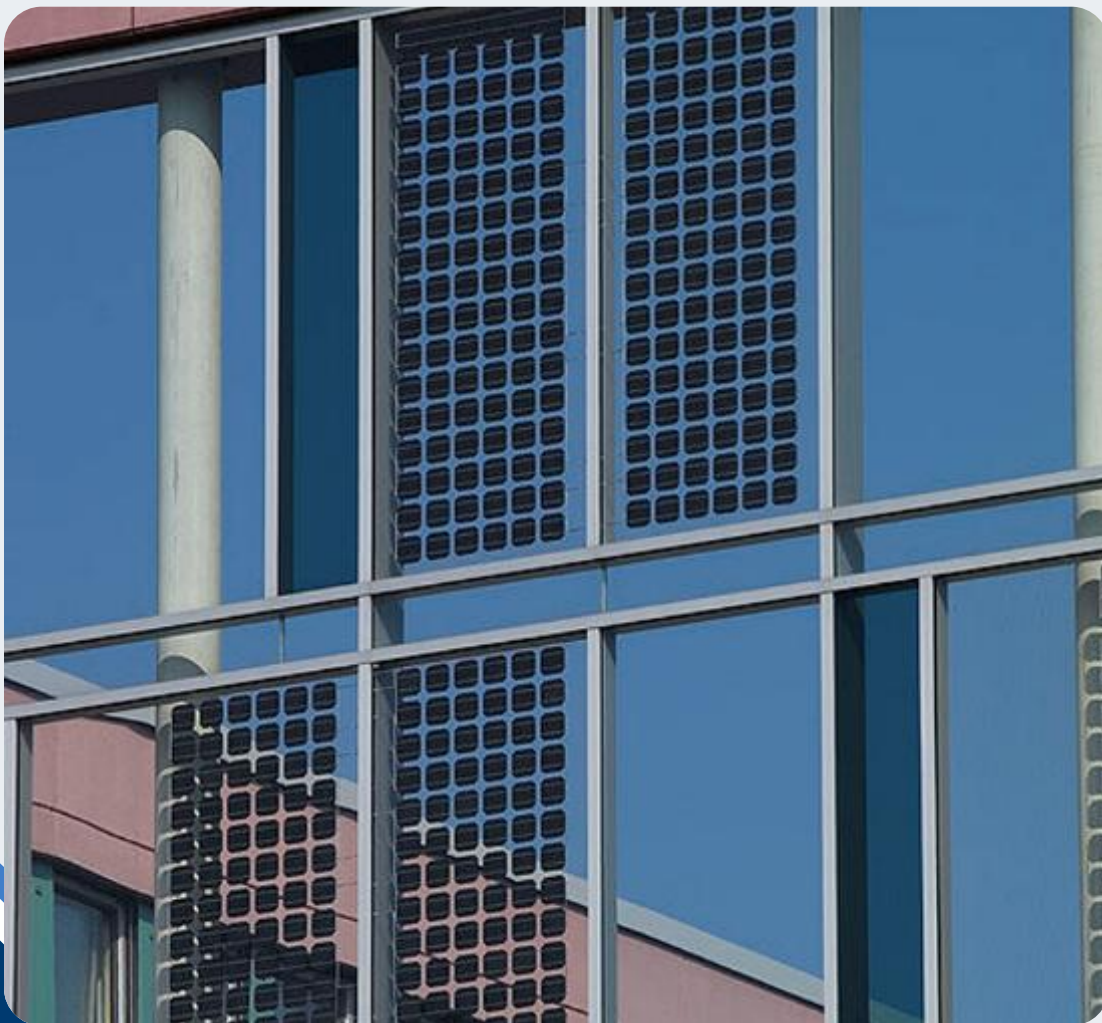












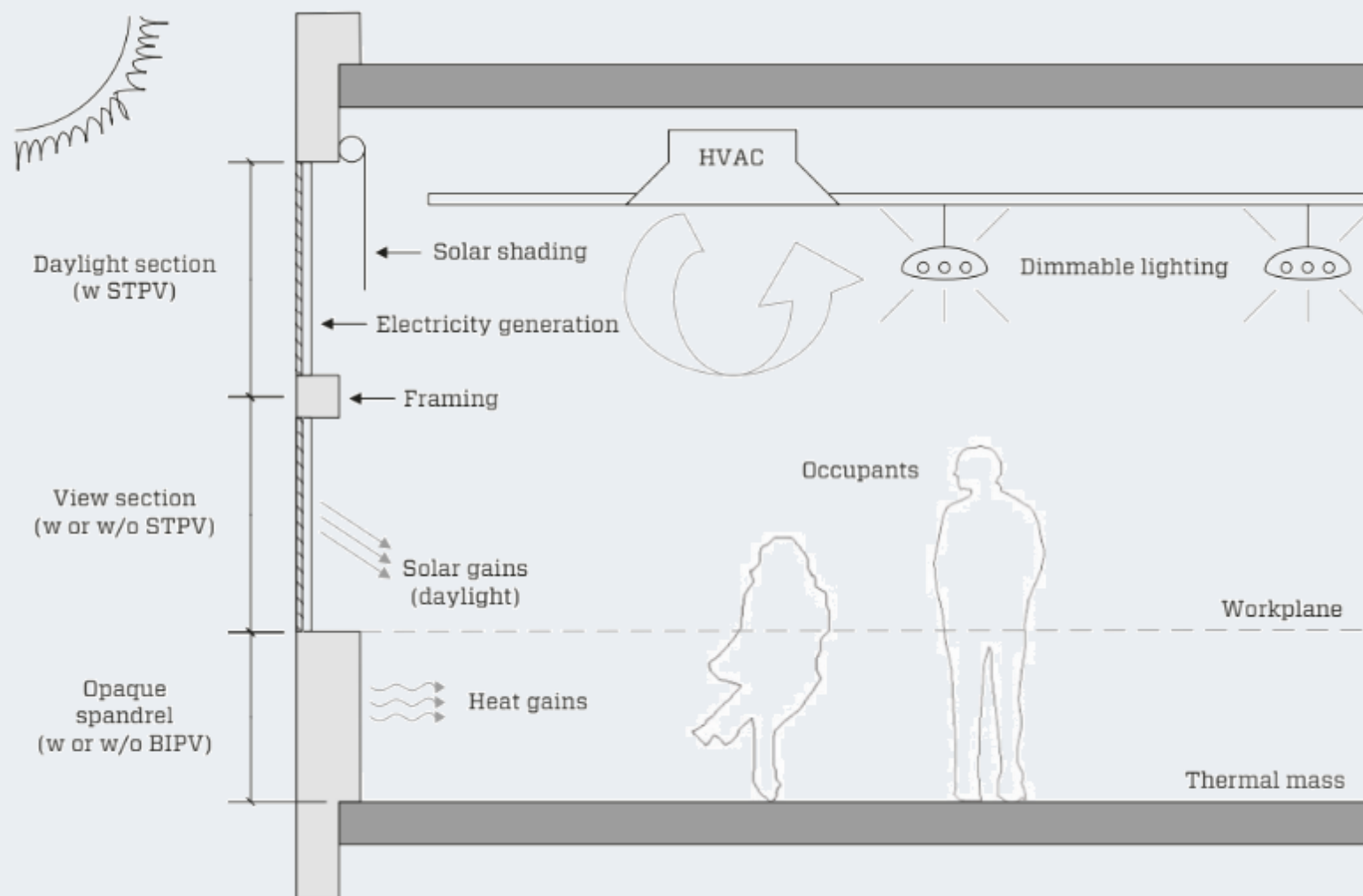


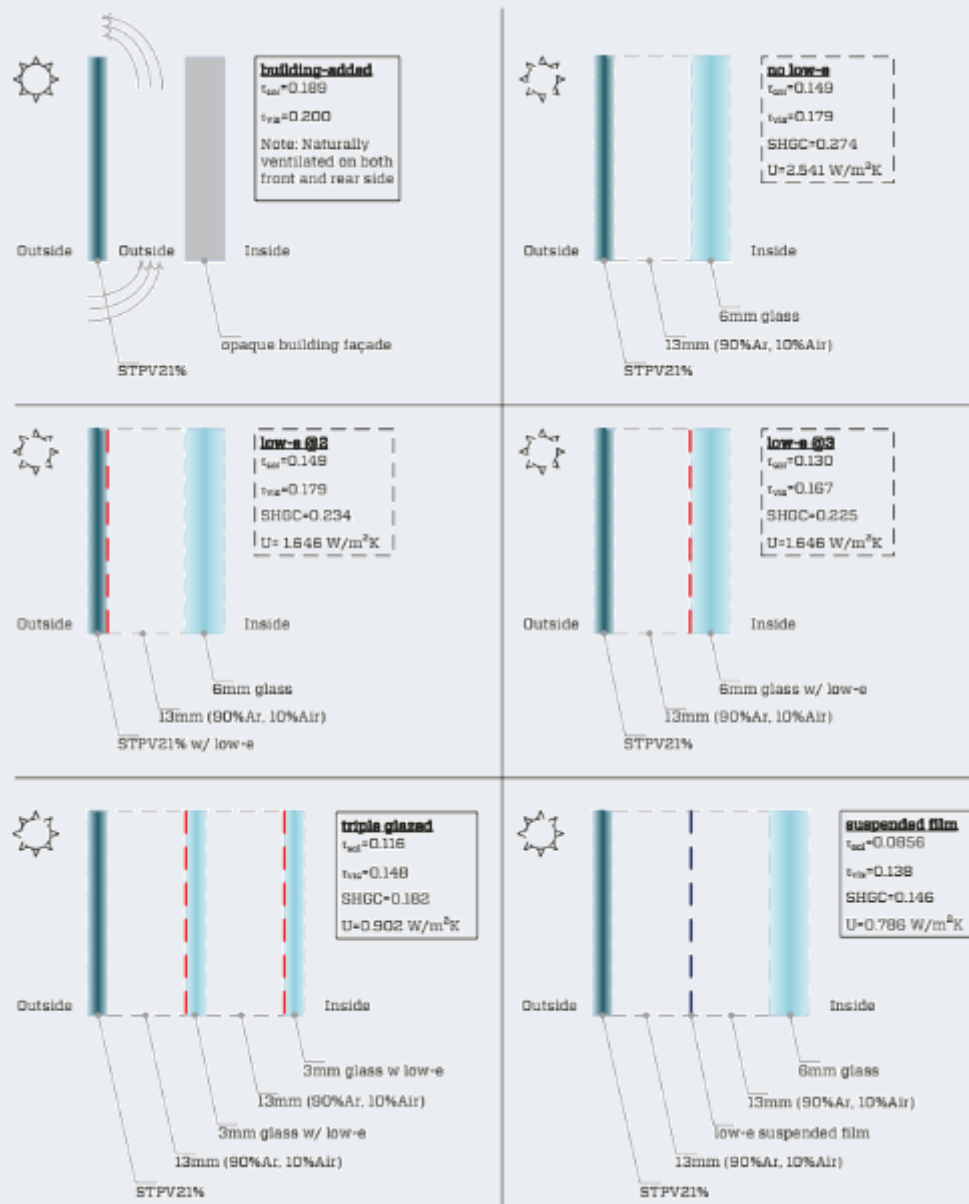


Transparent PV

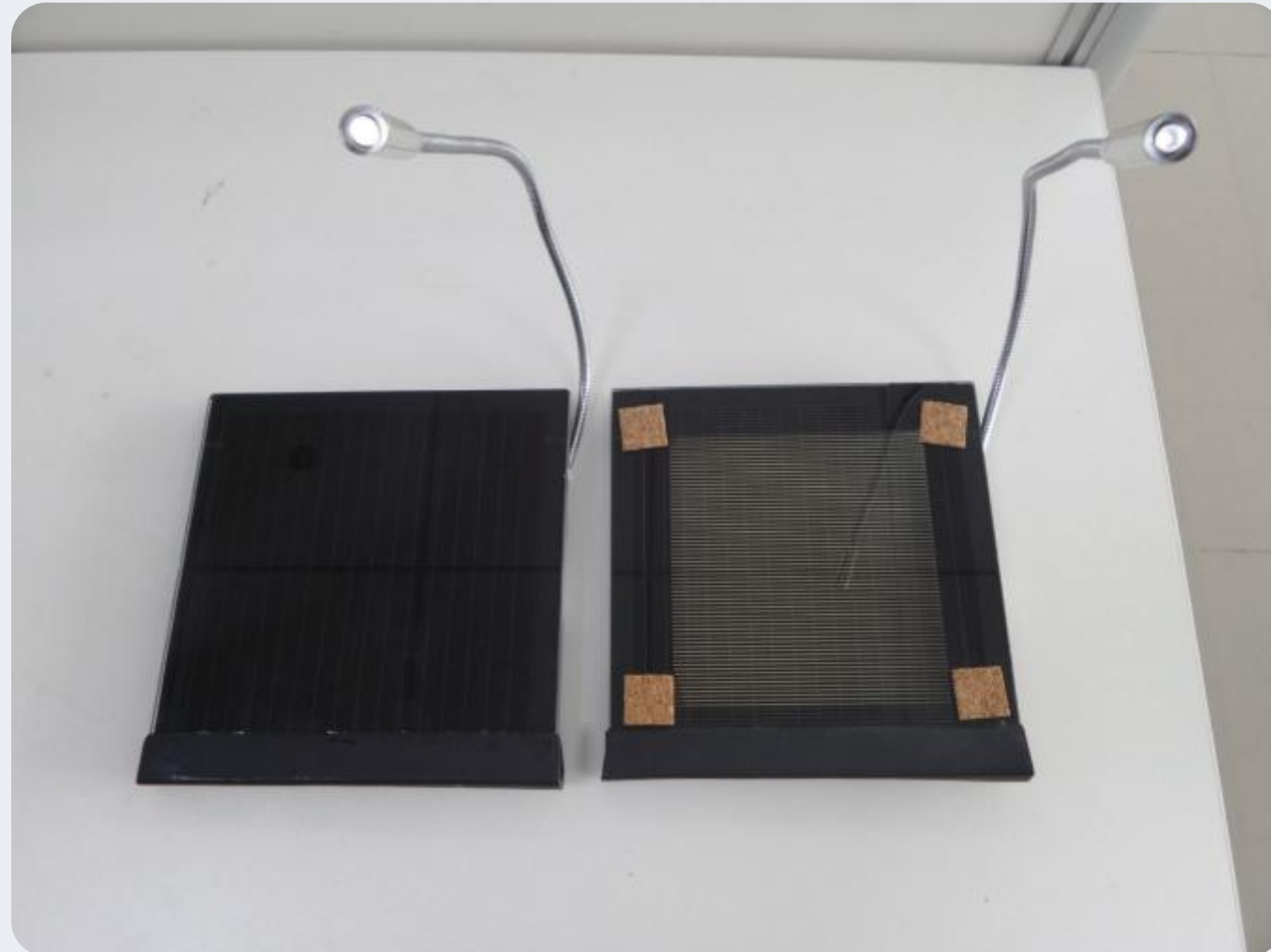


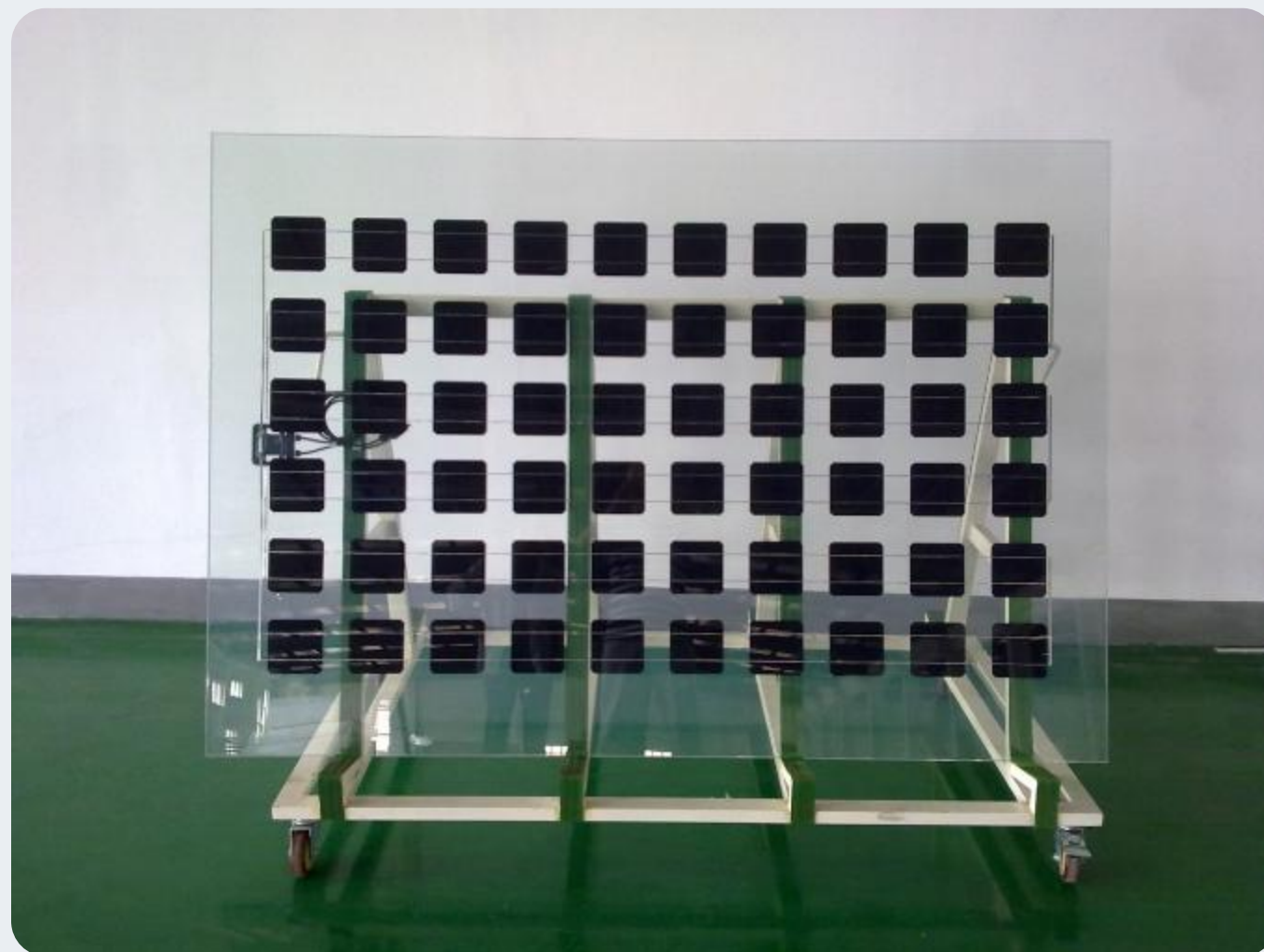
Figure 2.1. Matrix-based STPV windows using: poly-Si opaque spaced PV cells (left), induced-based “see-through” α -Si/ μ c-Si thin film (centre) and fully transparent α -Si/nc-Si thin film that can be used on intrinsic-based applications (right).



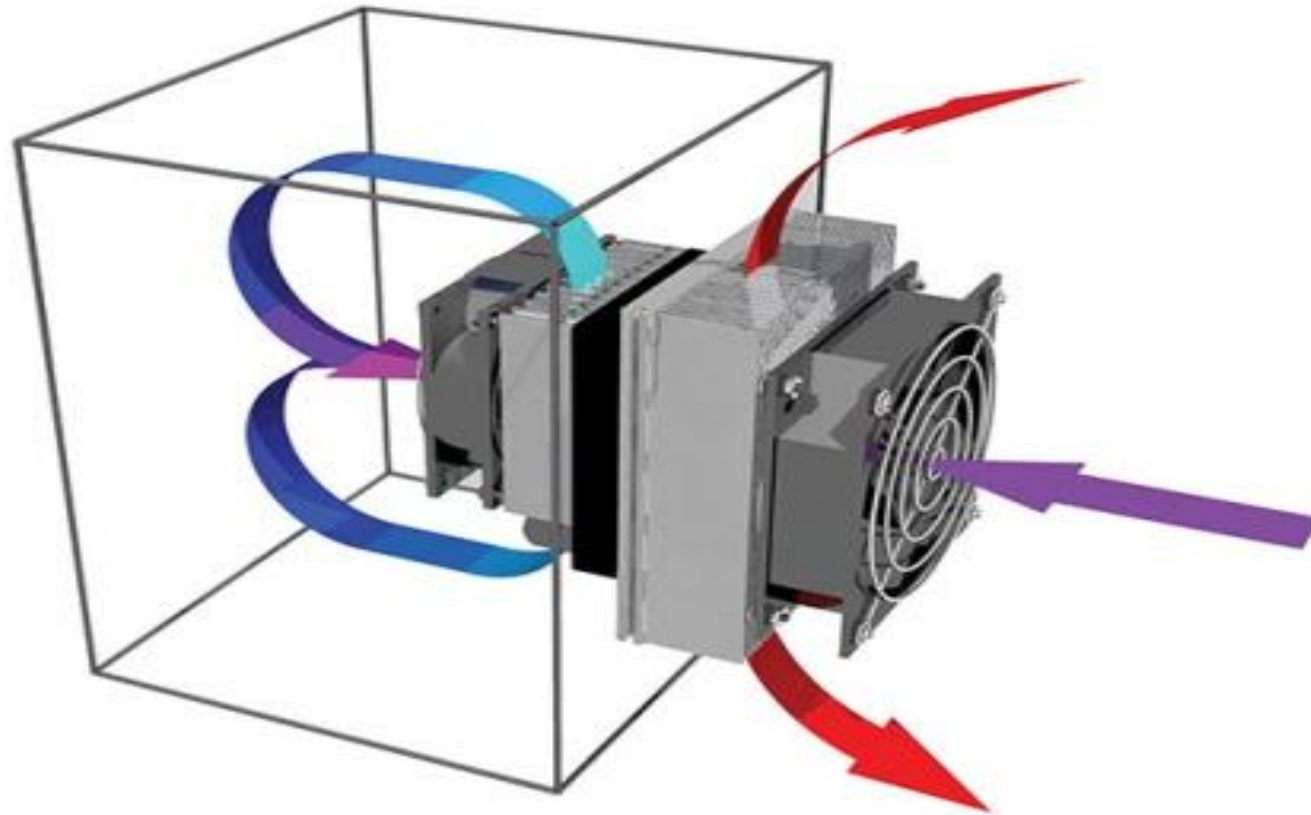


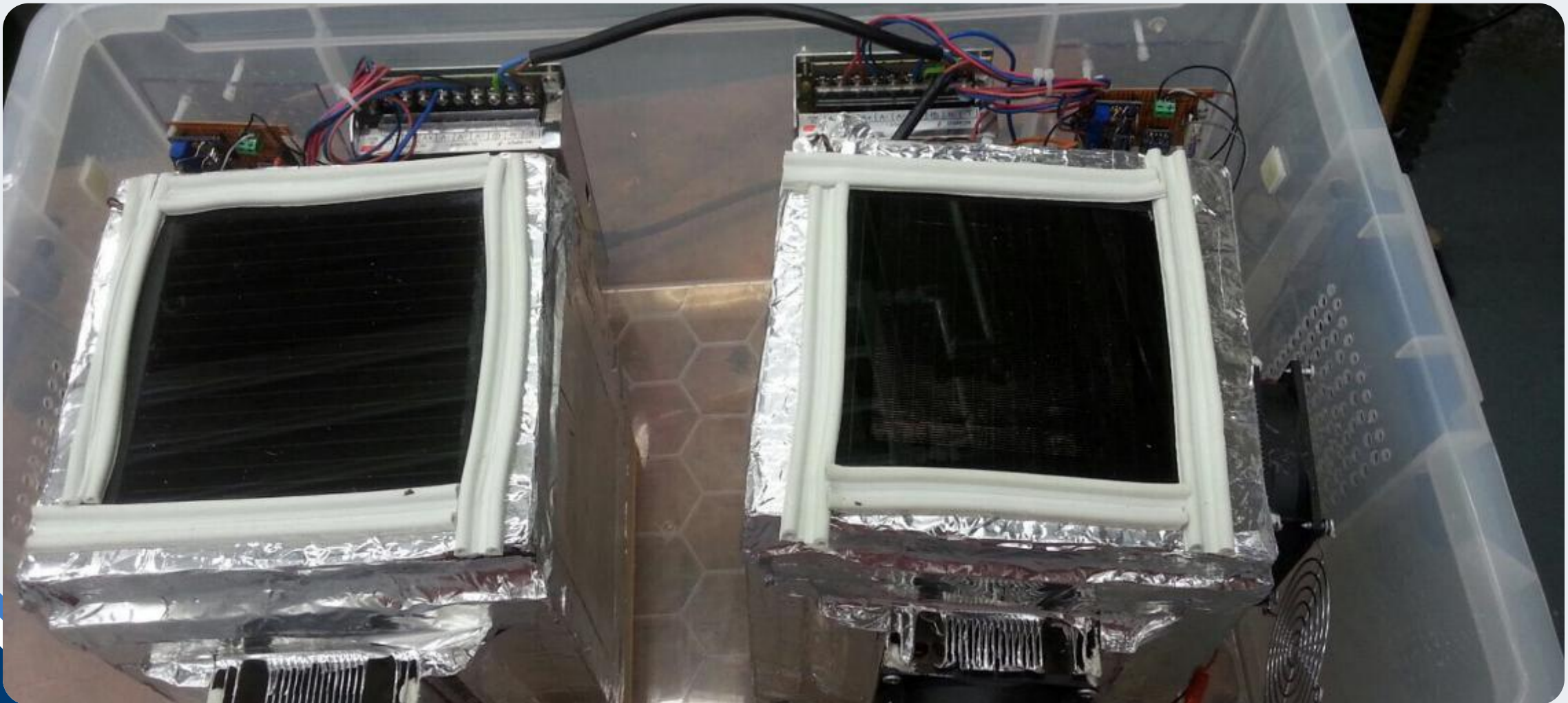
CdTe Transparent Thin Film 40%





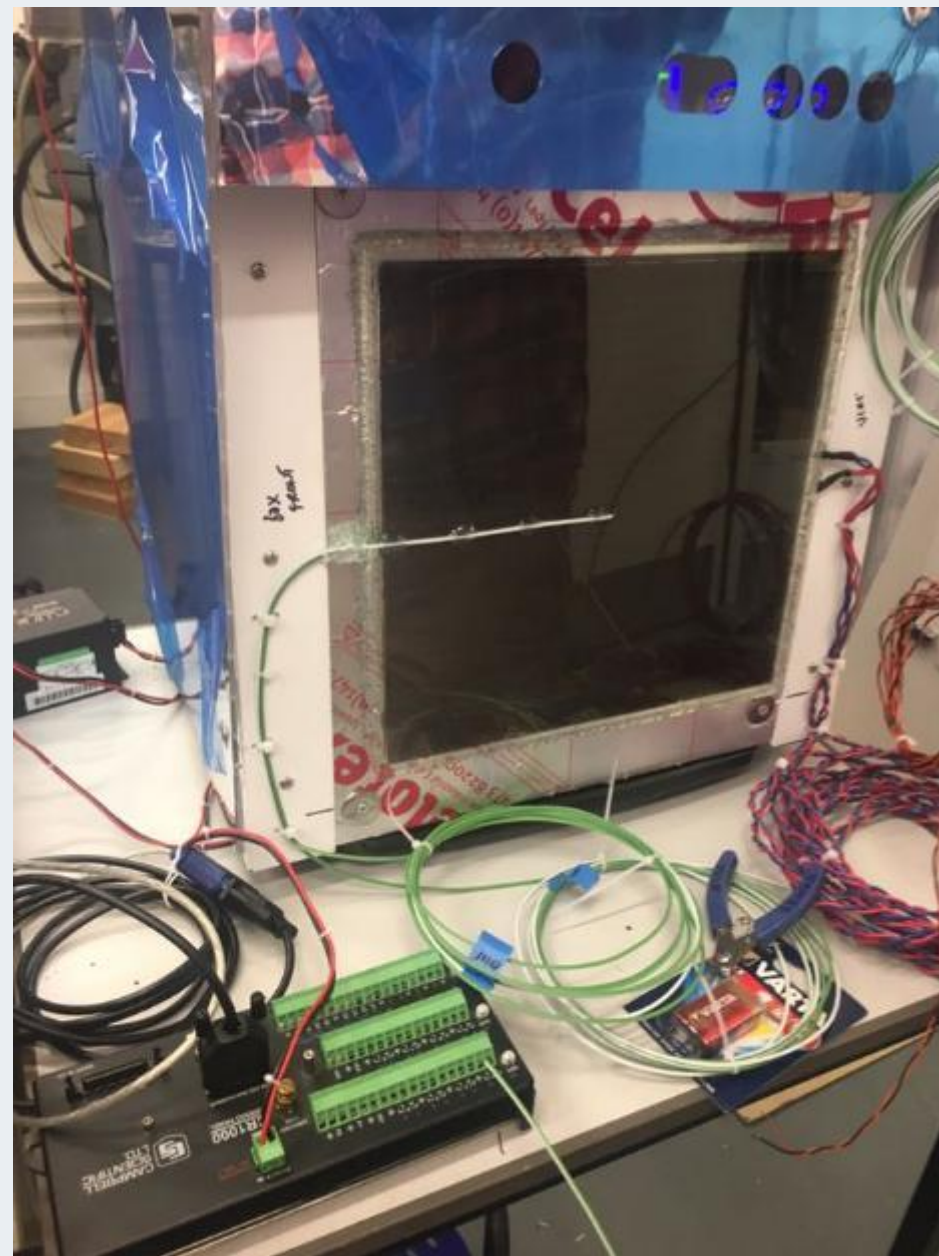
Room Sample





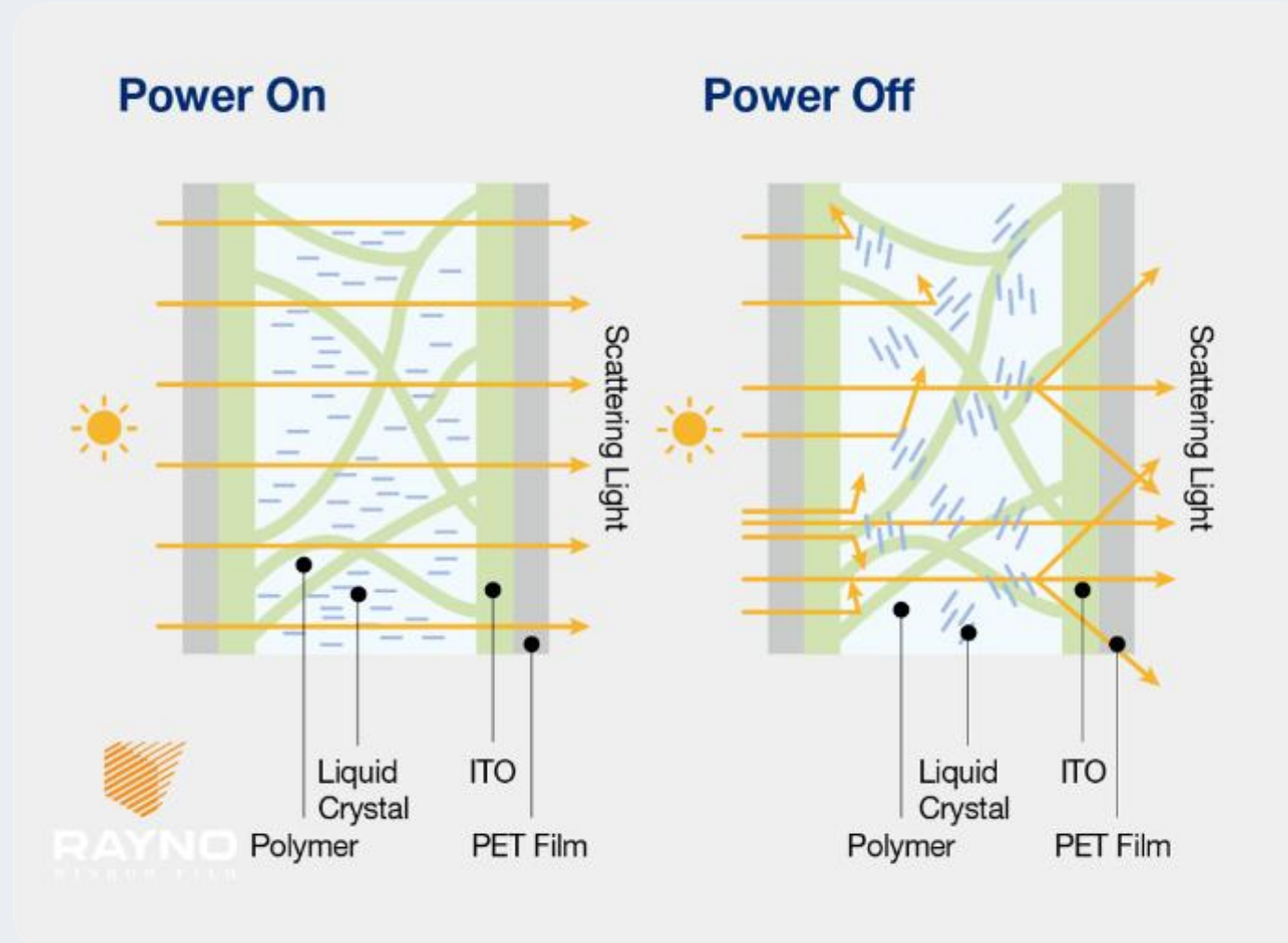


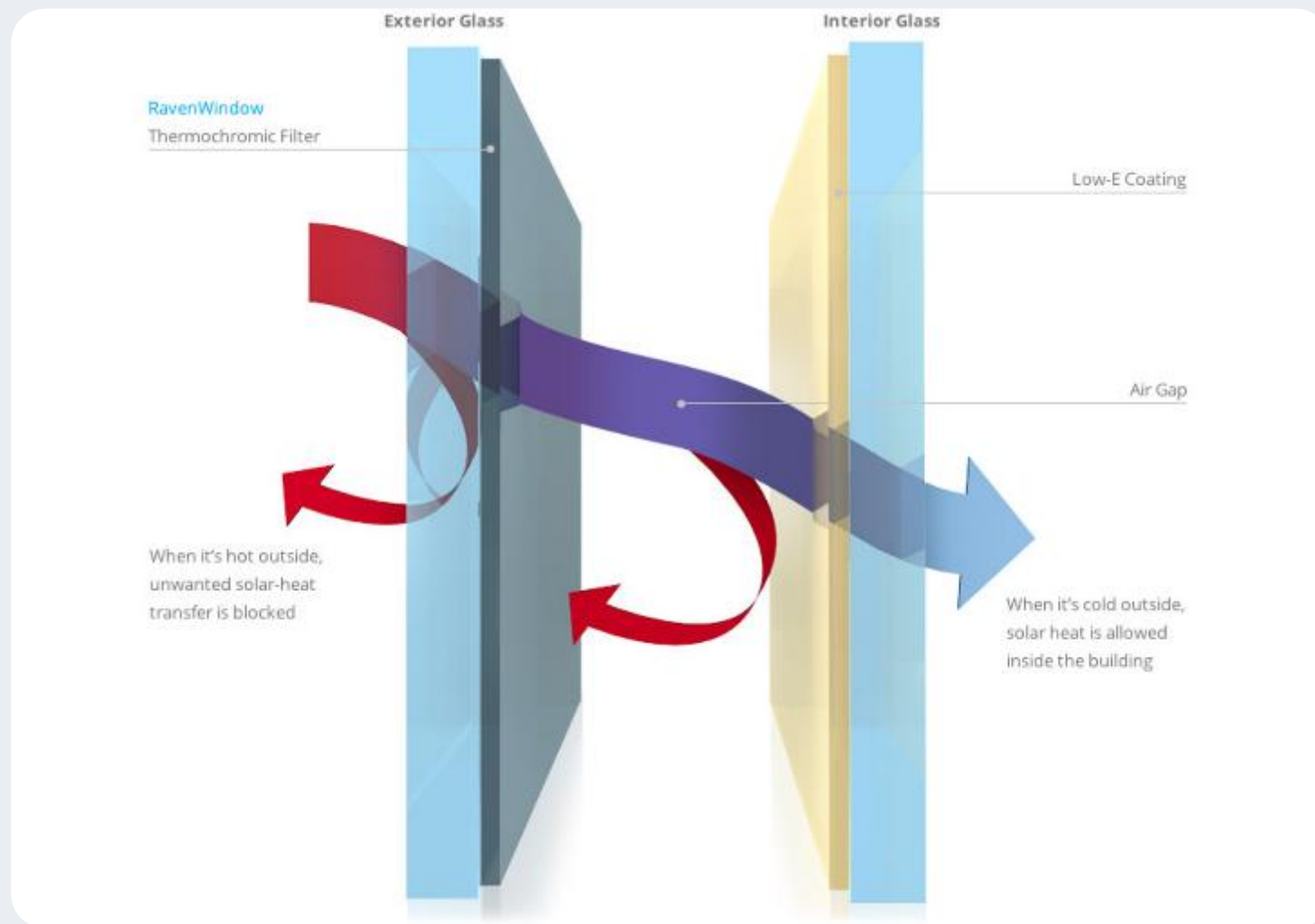




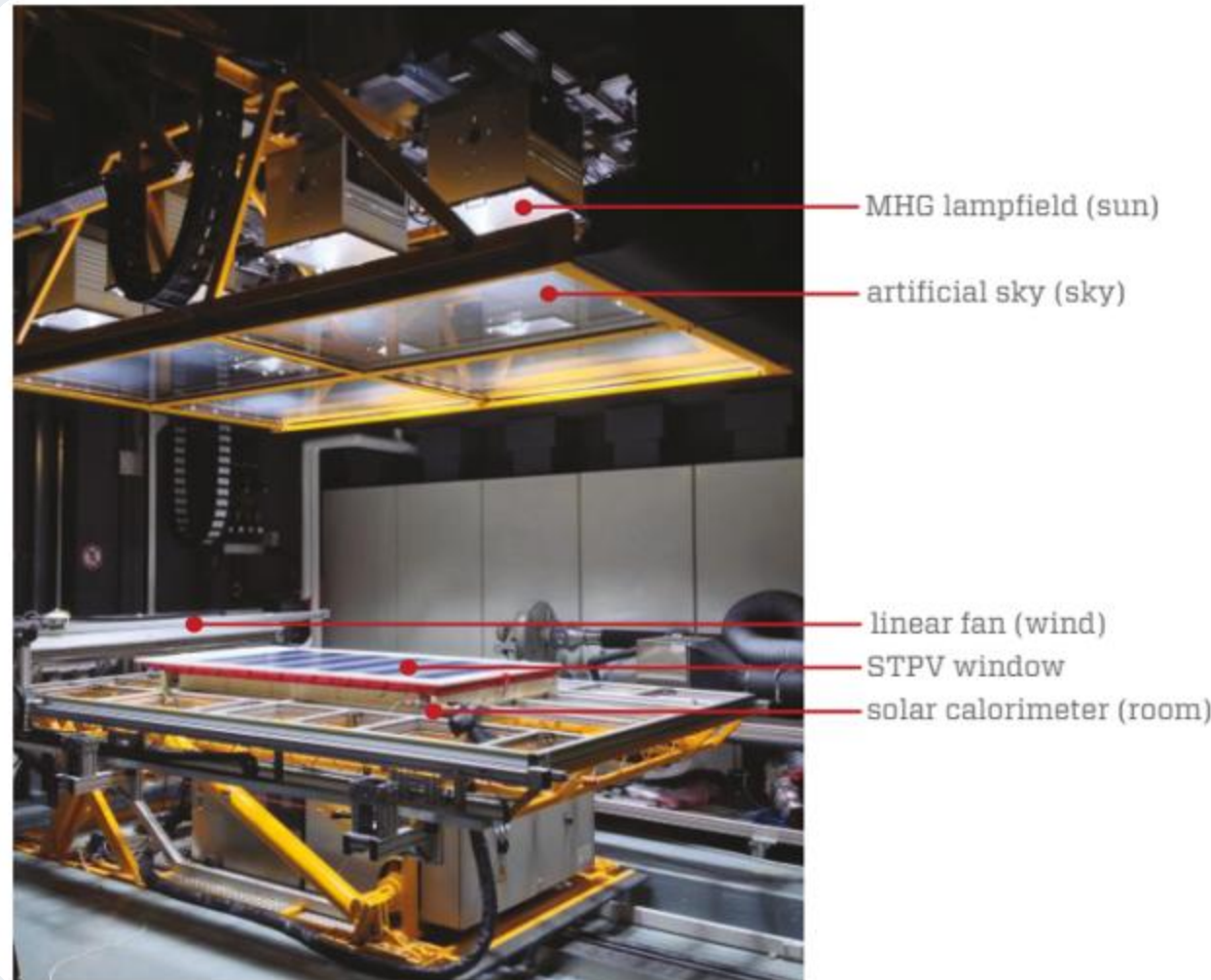


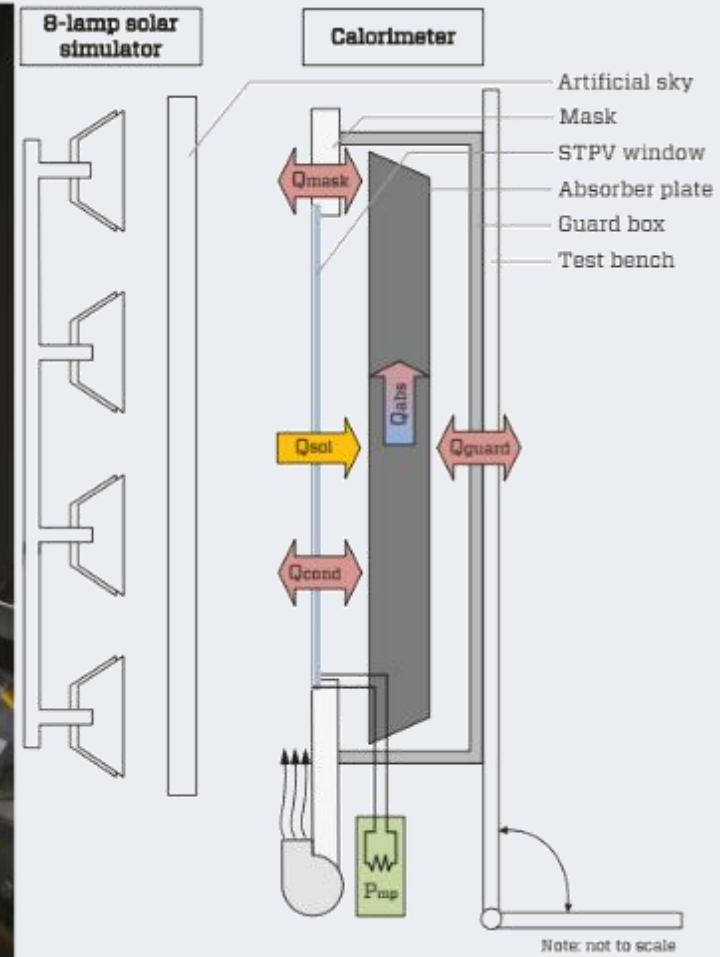
Smart Films PDLC





Solar Simulator





Software

- ✓ EnergyPlus
- ✓ IES Virtual Environment
- ✓ ANSYS
- ✓ TRANSSYS
- ✓ COMSOL
- ✓ MATLAB
- ✓ ETAP
- ✓ HOMER
- ✓ Meteonorm
- ✓ PVSysts
- ✓ BlueSol
- ✓ Pvsol

Tips & Hints

Transparent Solar Cells + Thesis + PDF

Google Scholar

https://scholar.google.co.uk/citations?user=RA2C_iQAAAAAJ&hl=en

Research Gate

https://www.researchgate.net/profile/Walid_Issa

Thank You!

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