



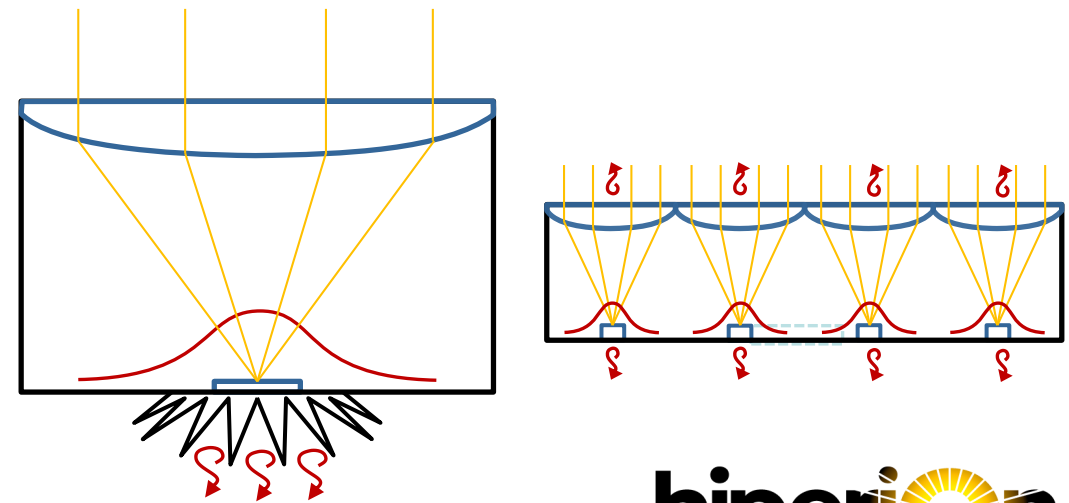
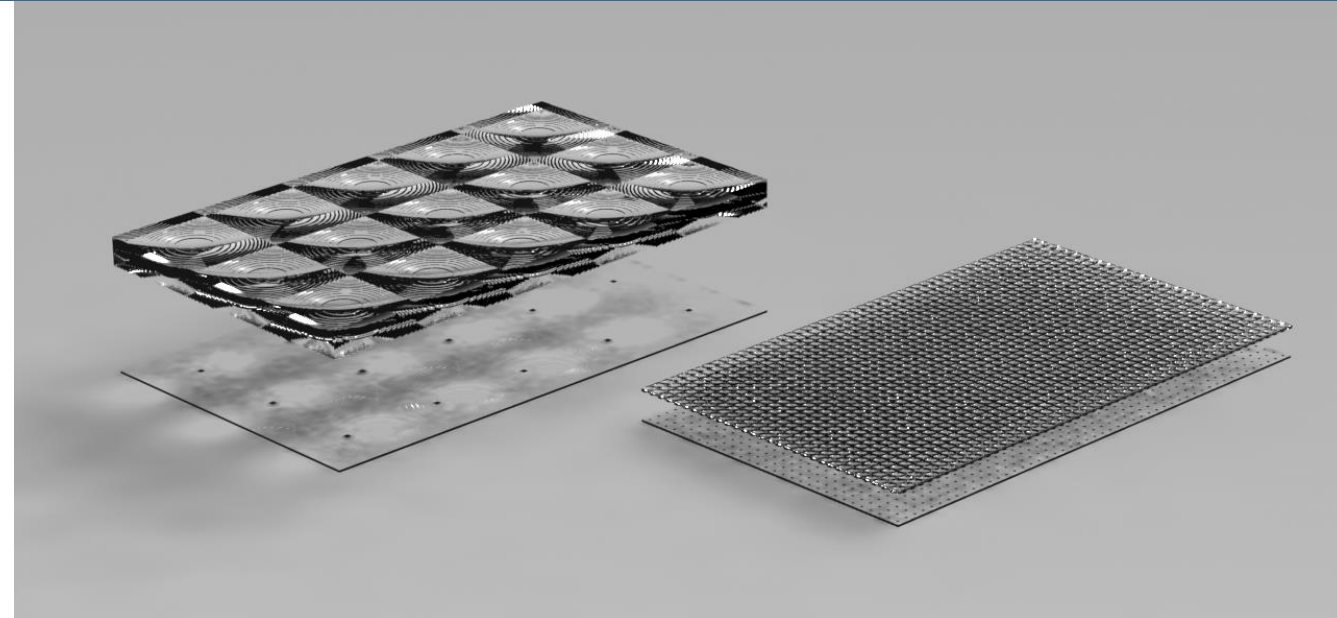
Micro-concentrator photovoltaics, a review of key technologies

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- Reduction in size of optics and solar cells
- Benefits:
 - Shorter optical path
 - Better thermal management
 - Lower current
 - Internal tracking and/or hybrid Flat-PV
- Enabling parallel manufacturing:
 - Chiplet printing/Stamp printing
 - Fluid self assembly
 - R2R embossing for optics

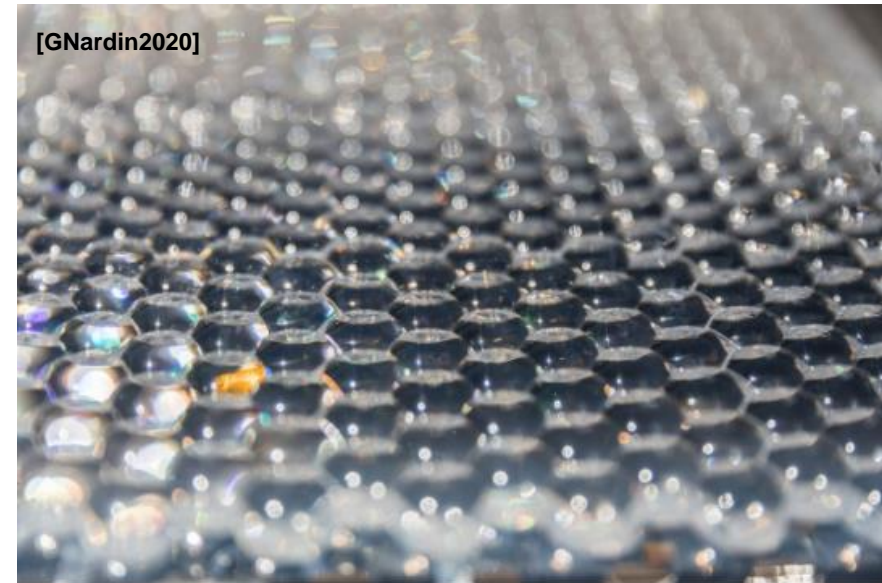


- Semprius HCPV
 - 900 – 1000 X
 - 600-1000mm solar cells
 - Cell on board, transfer printed
 - 35% Efficiency 3Junction (36.6 4Junction)
- Insolight Hiperion Integrated Tracking
 - Tracking range 50% opt.eff. = 58°
 - 1000mm solar cells, 178X
 - Chip-on-board encapsulant as secondary, pick and place
 - 34% Module Efficiency 3Junction (Achievable, current 29%)

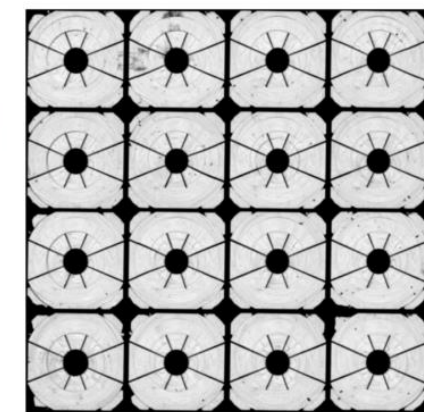
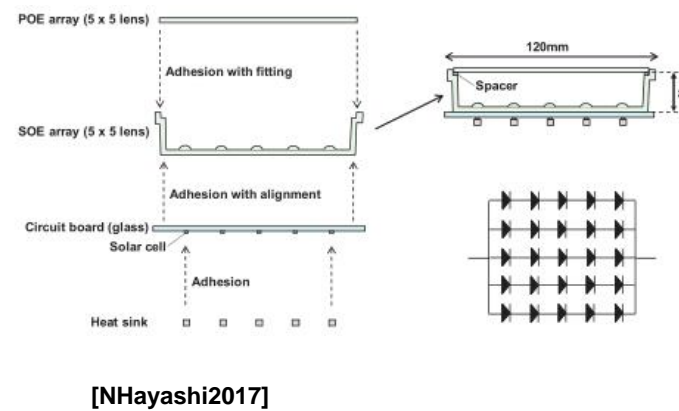
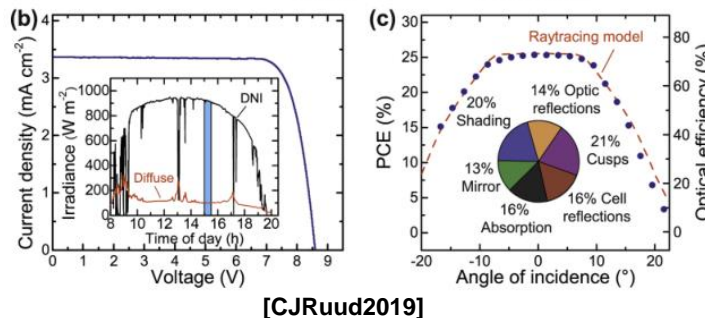
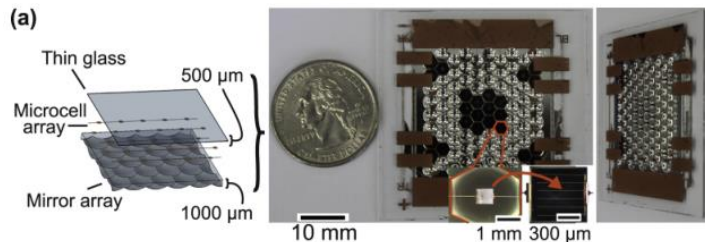
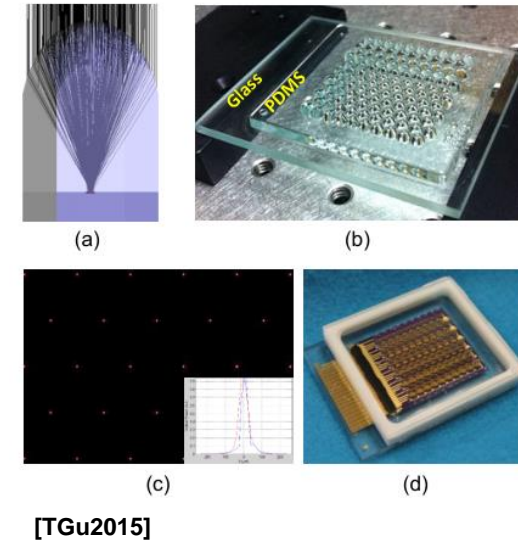
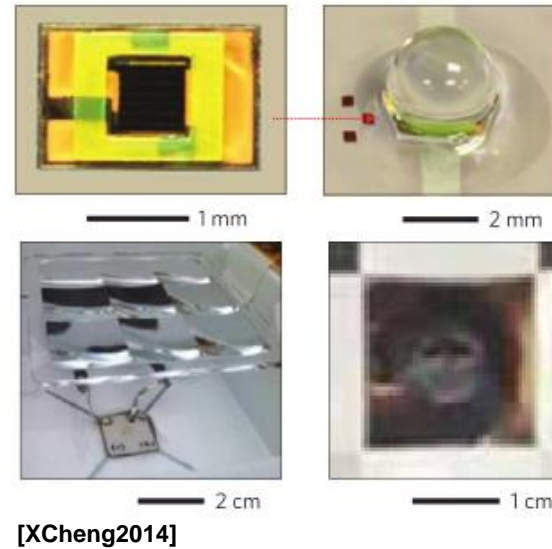
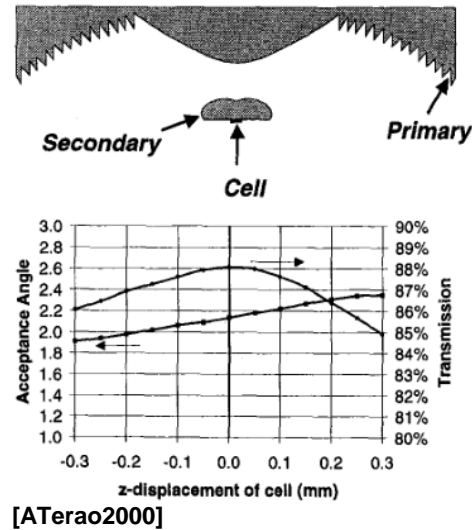
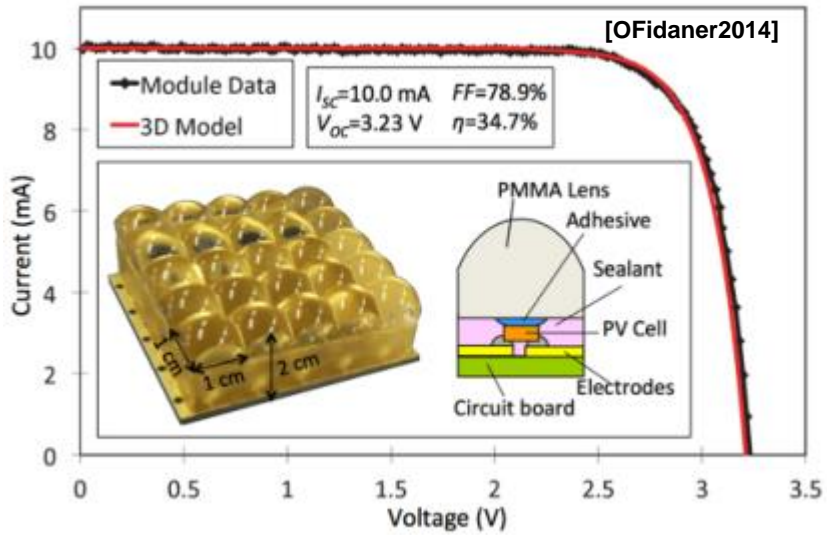
[Burroughs2010]



[GNardin2020]



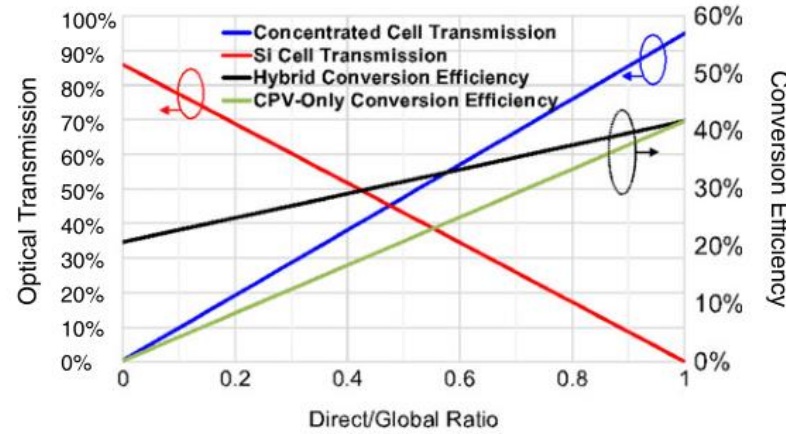
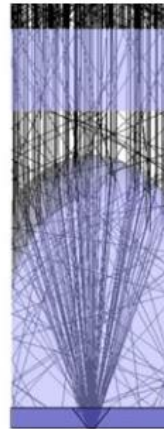
Key Prototypes (Images)



Key Prototypes Hybrid (Images)

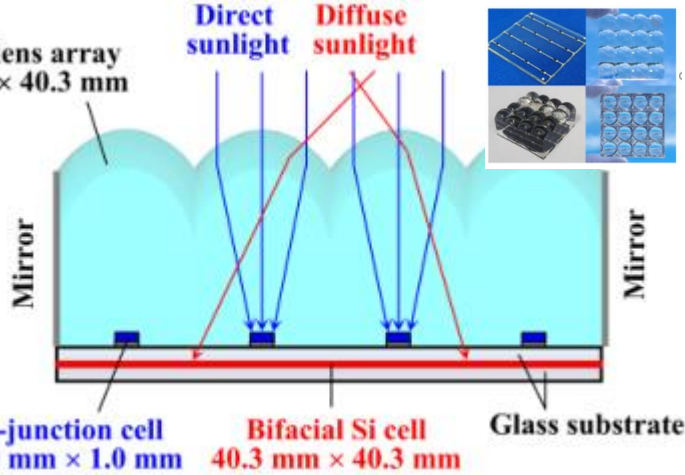


[DLi2018]

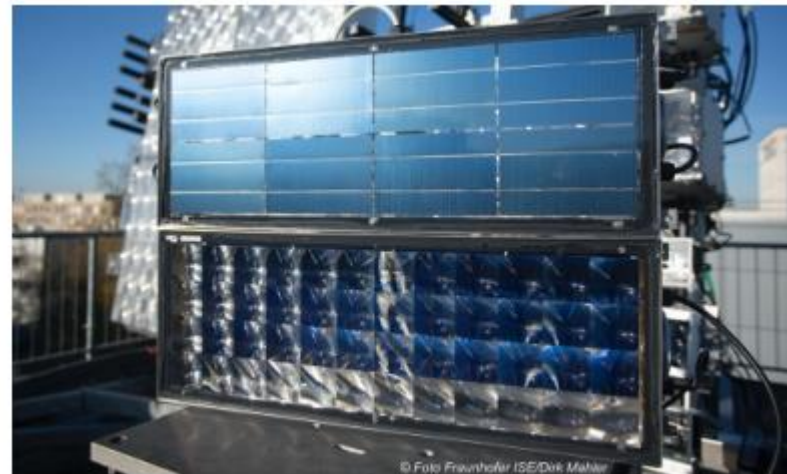


Silicone lens array
40.3 mm × 40.3 mm

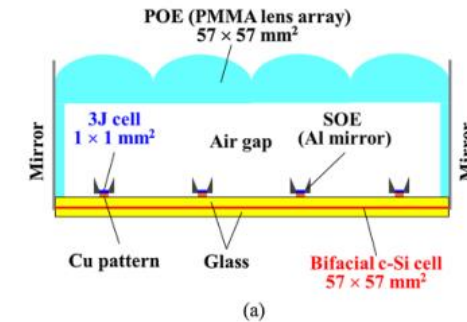
Direct sunlight
Diffuse sunlight



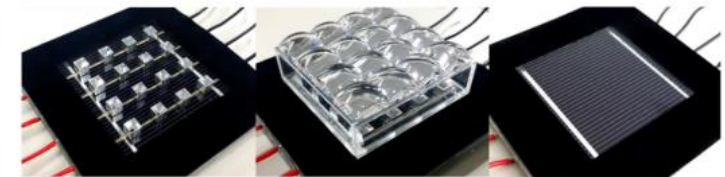
[DSato2019]



[JFMartinez2020]



(a)

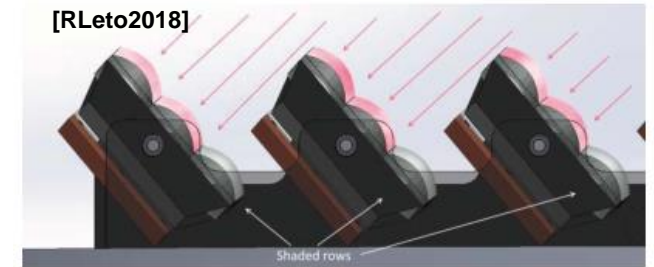
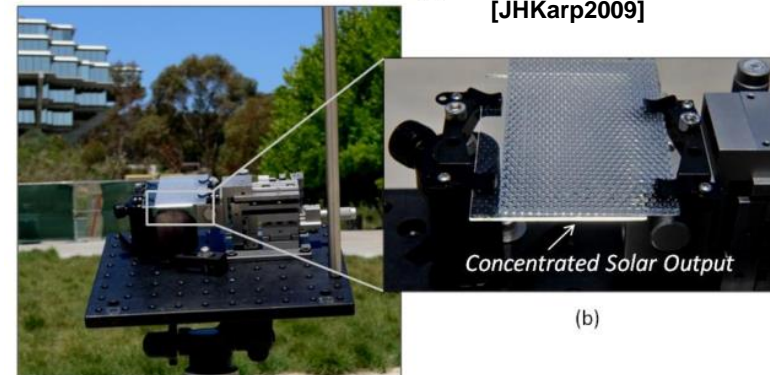
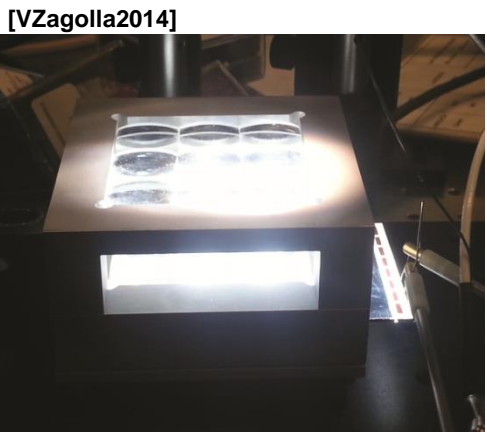
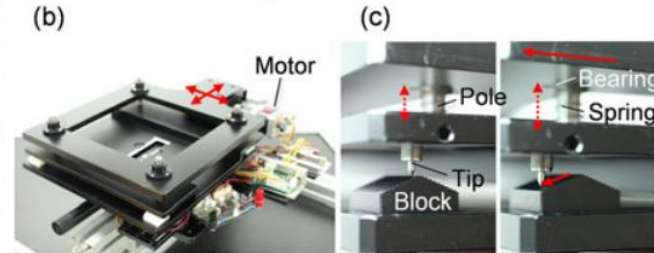
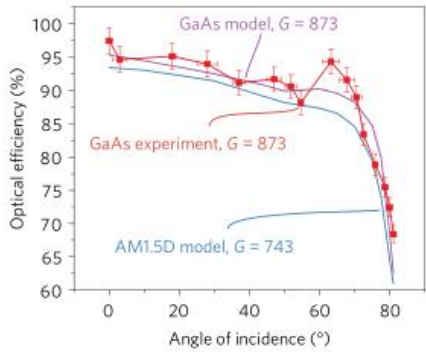
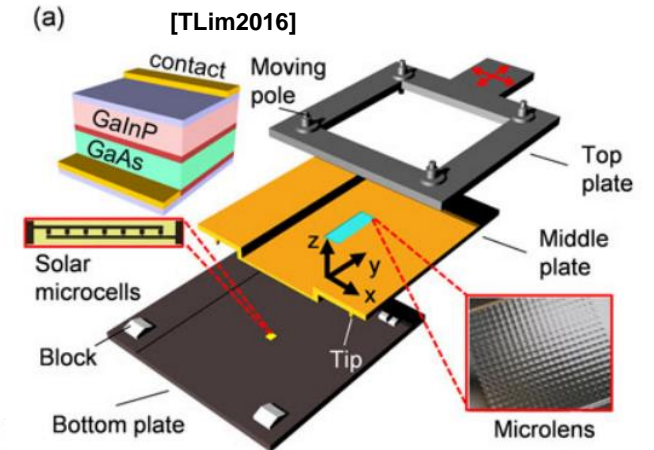
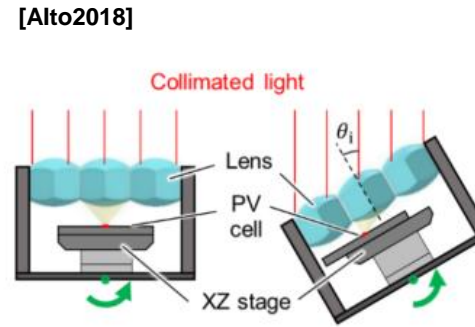
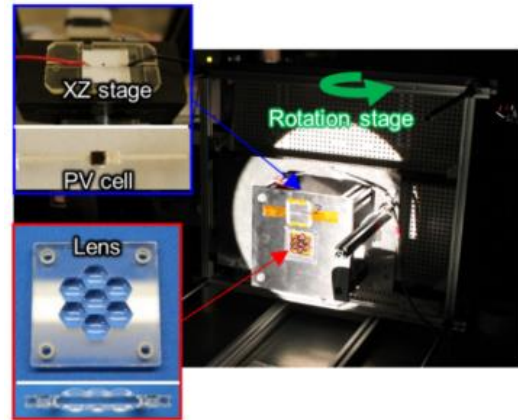
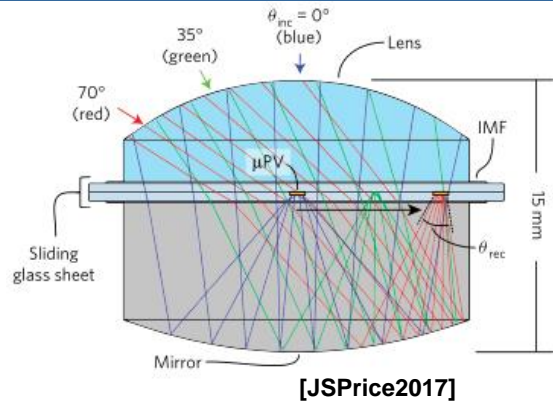


(b)

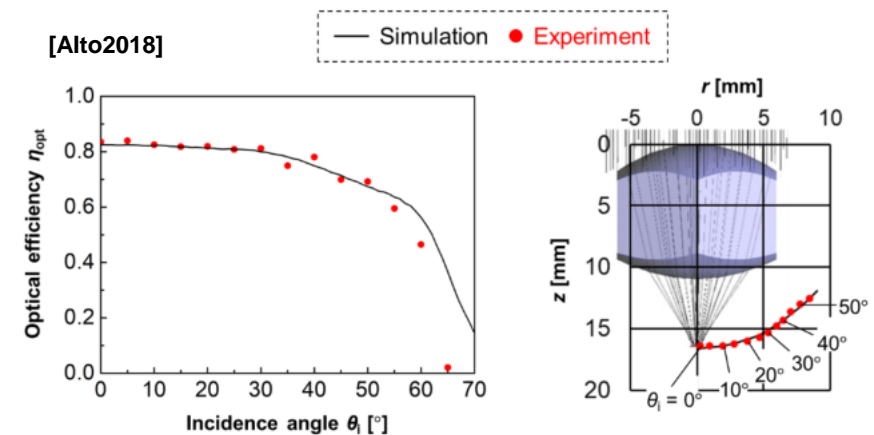
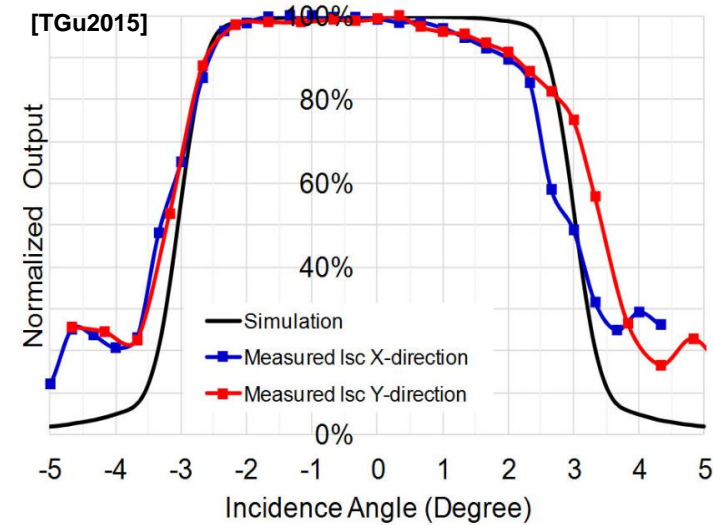
[NYamada2016]



Key Prototypes Tracking (Images)



- Prototypes plotted in graph
 - X – Concentration
 - α – Acceptance angle defined as angle with 90% of max. opt. eff.
 - Tracking range defined as angle for which optical efficiency reduces to 50%
 - Cell size is side of a squared solar cell
 - CAP (Concentration acceptance product), the higher closer to maximum possible concentration





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We gratefully acknowledge the support of these institutions:

