

Wafer Integrated Microscale Photovoltaics

High-Efficiency PV Systems in High-Diffuse Areas

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Diffuse Light Collection

- *High efficiency concentrated photovoltaic (CPV) systems produce the most power in the smallest footprint*
- *CPV is only financially viable in geographic areas with lots of sunny days and little pollution, such as Albuquerque*
- *Sandia is working on new module architectures to make high efficiency photovoltaics viable in geographic areas with lots of overcast days, such as Seattle*

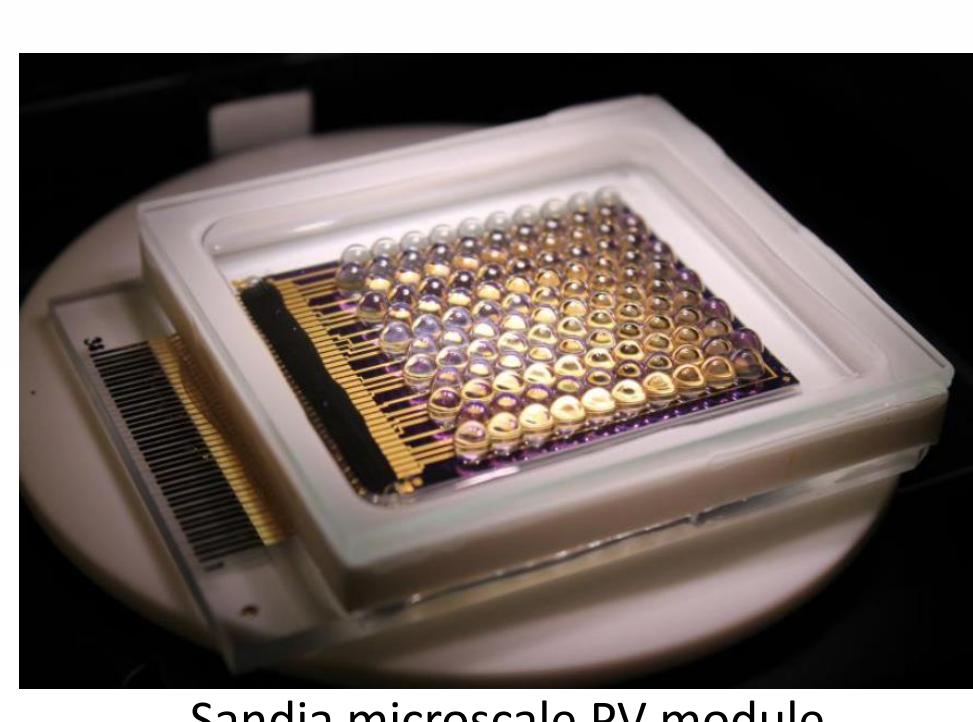
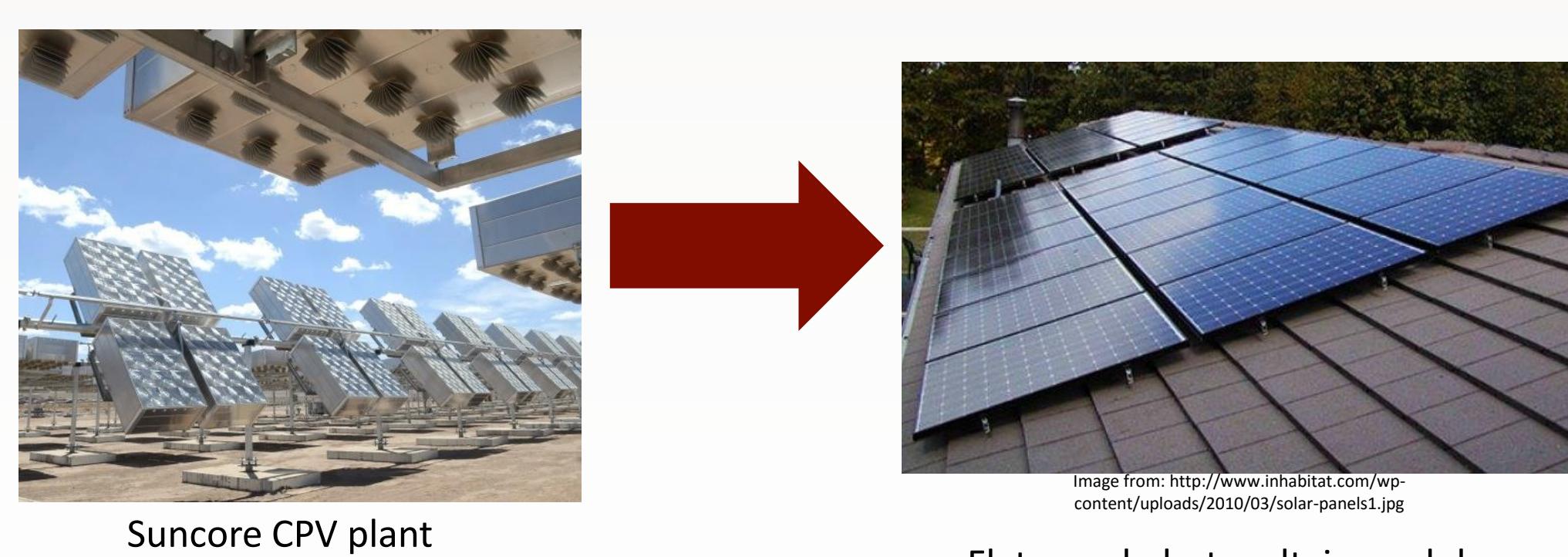


Photovoltaic array on a cloudy day

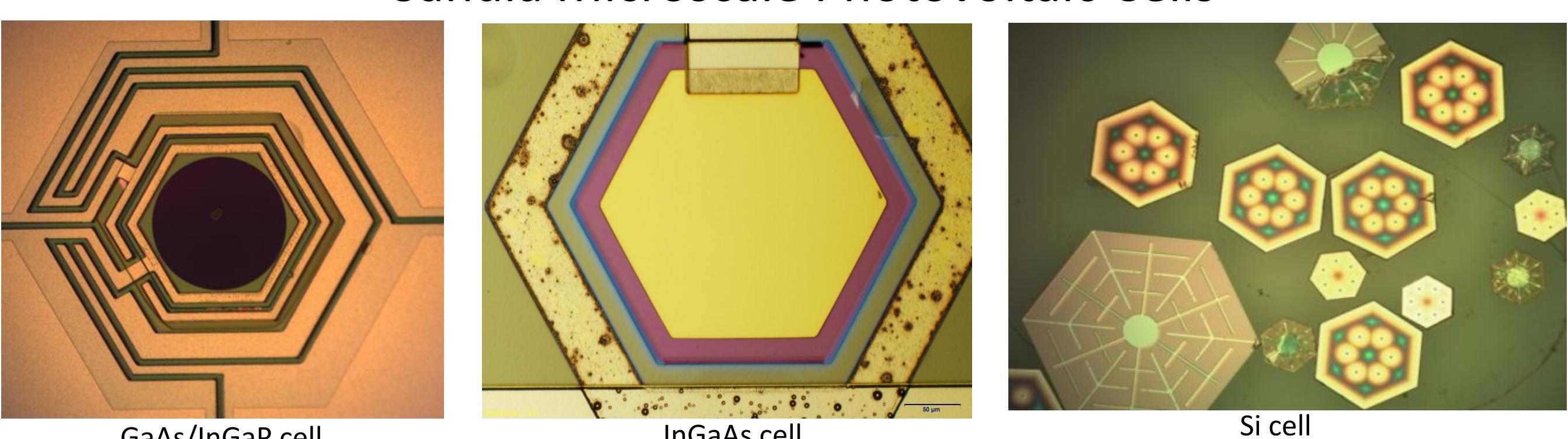
Microscale Photovoltaics



- *Reducing cell size from cm to sub-mm dimensions enables high-efficiency PV architectures with flat panel form factors*



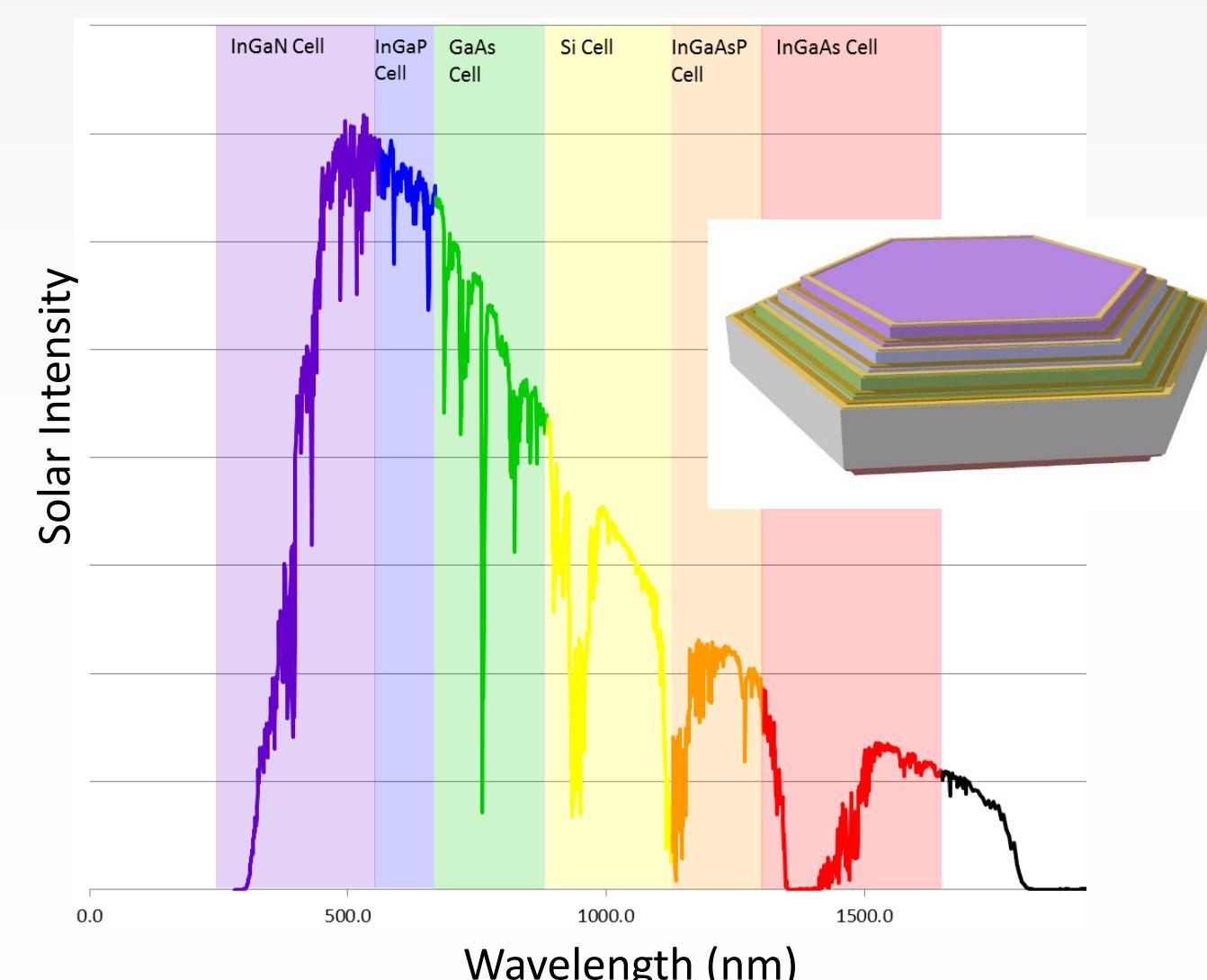
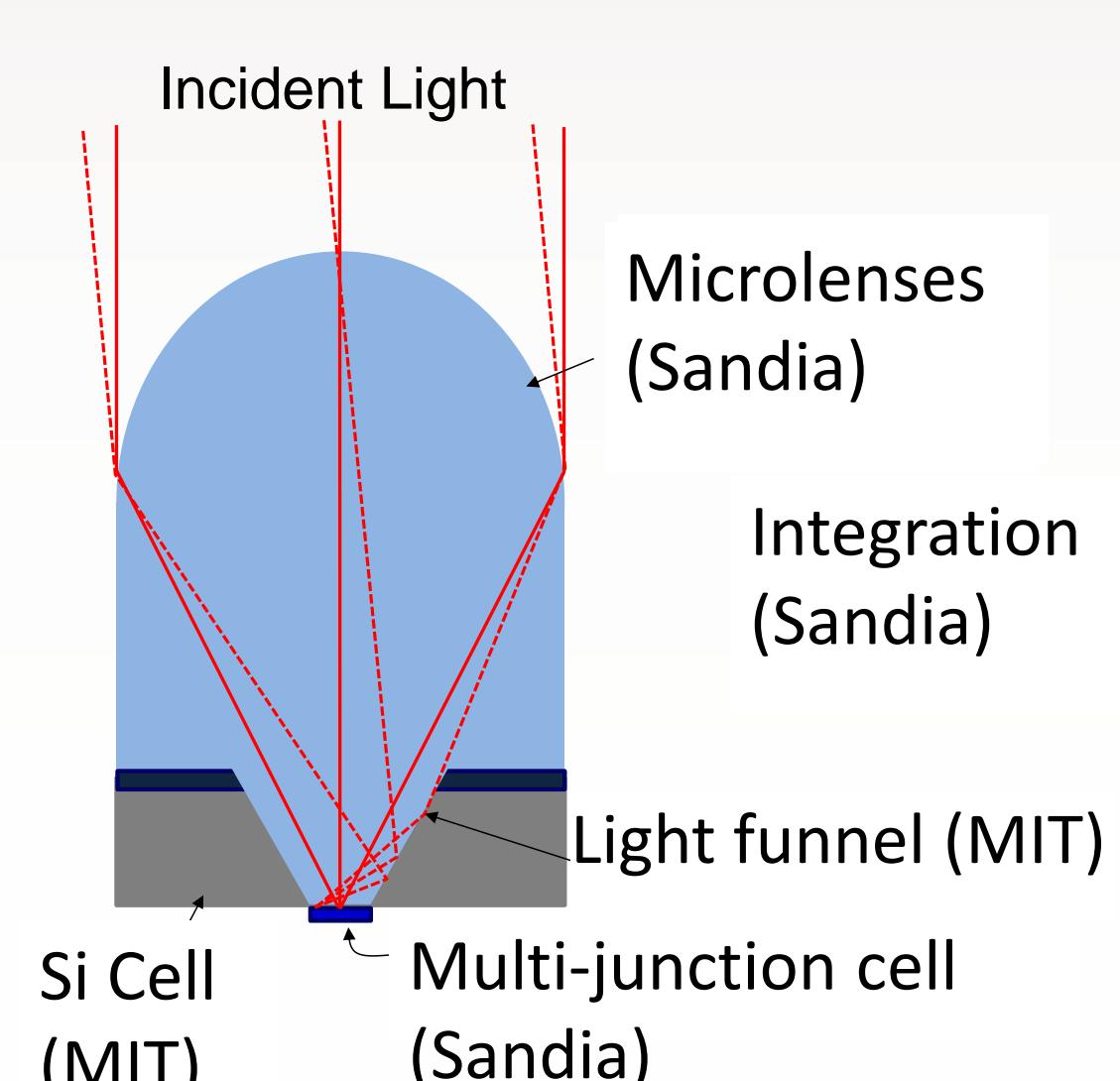
Sandia Microscale Photovoltaic Cells



Wafer-integrated Photovoltaic System



- *Si wafer platform enables a hybrid PV approach with:*
 - *Light funnel*
 - *Mounted III-V multi-junction cells*
 - *Si cell to collect light that escapes funnel*



- *Design, fabrication and characterization of microscale III-V cells in MESA*
- *Sandia's advanced manufacturing capability fabricates microlenses and assembles module*

