

Towards Atomically Thin Solar Cells for Space Power

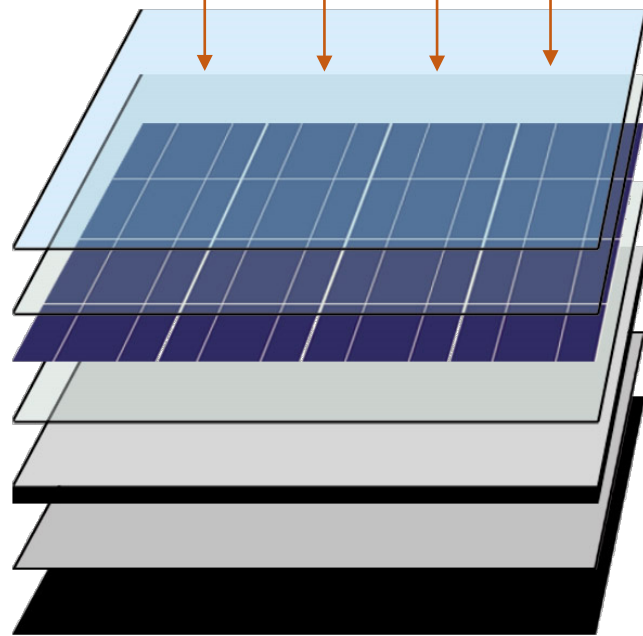
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Power
—
Mass

$$P_{\text{sun}} = 1367 \text{ W/m}^2$$



> 1mm



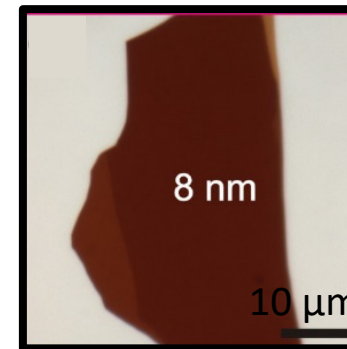
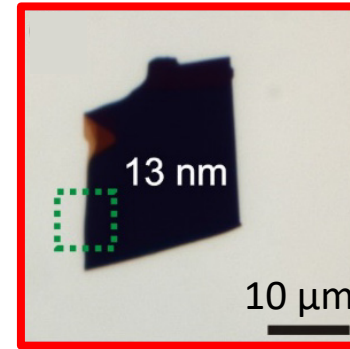
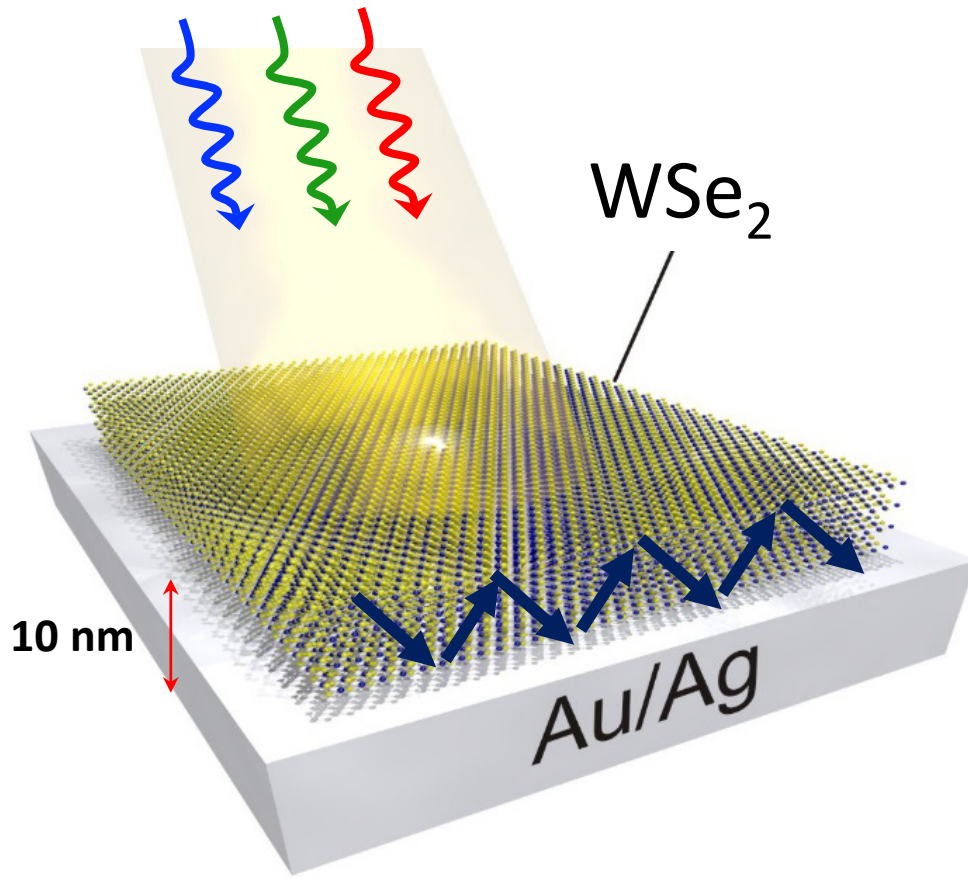
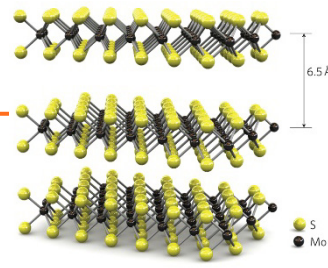
Cover glass ($\sim 100 \mu\text{m}$)
– radiation shielding

Active layer ($\sim 100 \mu\text{m}$)
– actual solar cell

Mechanical support
(1 - 10 mm)

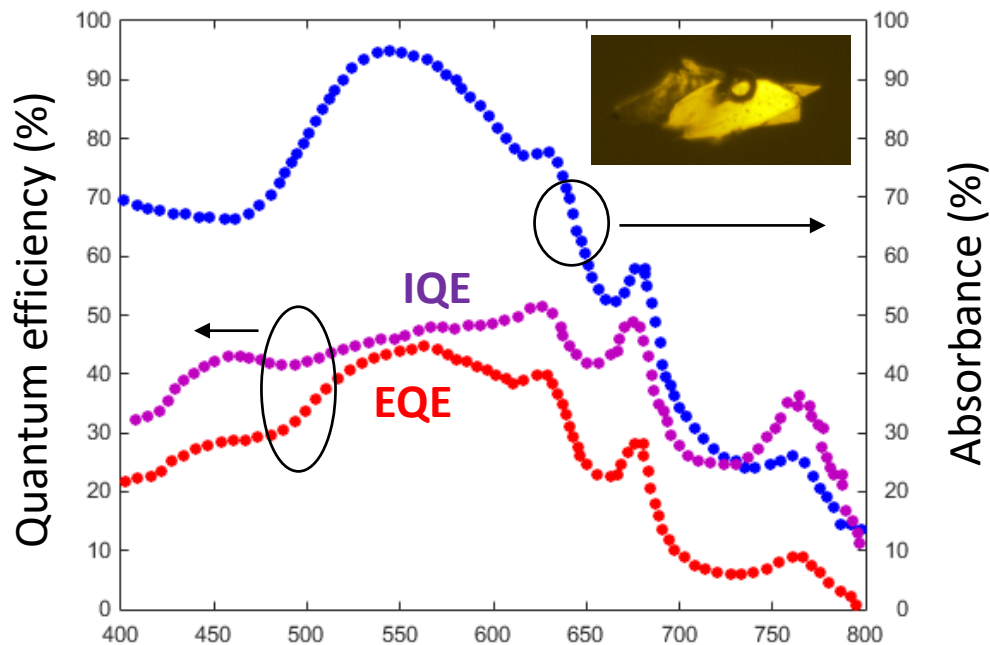
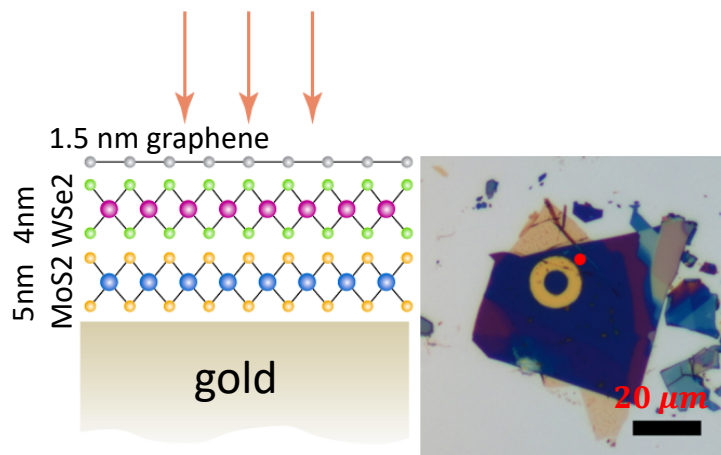
Thermal control layer
($\sim 100 \mu\text{m}$) – heat
emission

Near unity light absorption in 2D materials

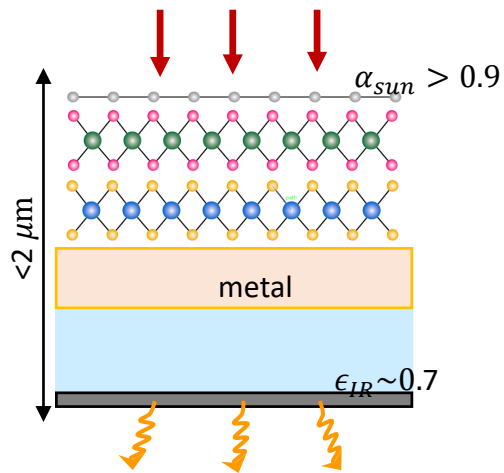


Broadband, near-unity absorption (>80%) in 13 nm thick layer

Atomically thin photovoltaic cells



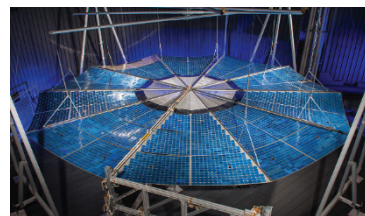
Power conversion efficiency **4%** (Shockley-Queisser limit **>20%**)



$$\eta = 20\%, T \leq 80\text{C}^\circ$$

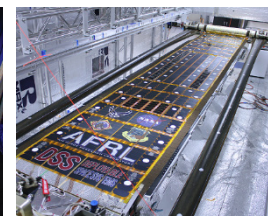
>10 kW/kg
(assuming 20% efficiency
and 10 μm total thickness)

Megaflex array



0.15 kW/kg

Roll out solar array



0.2-0.5 kW/kg