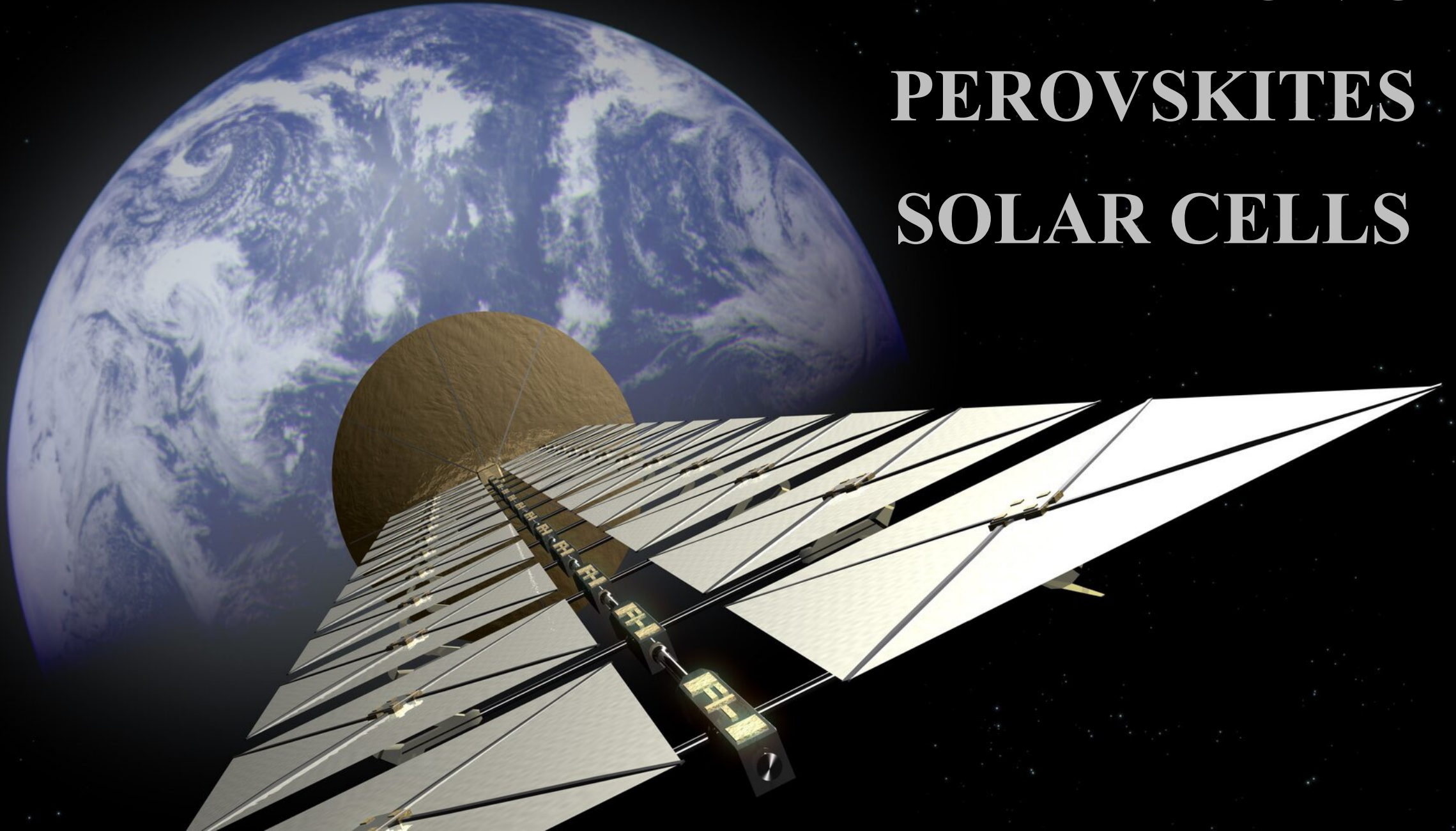
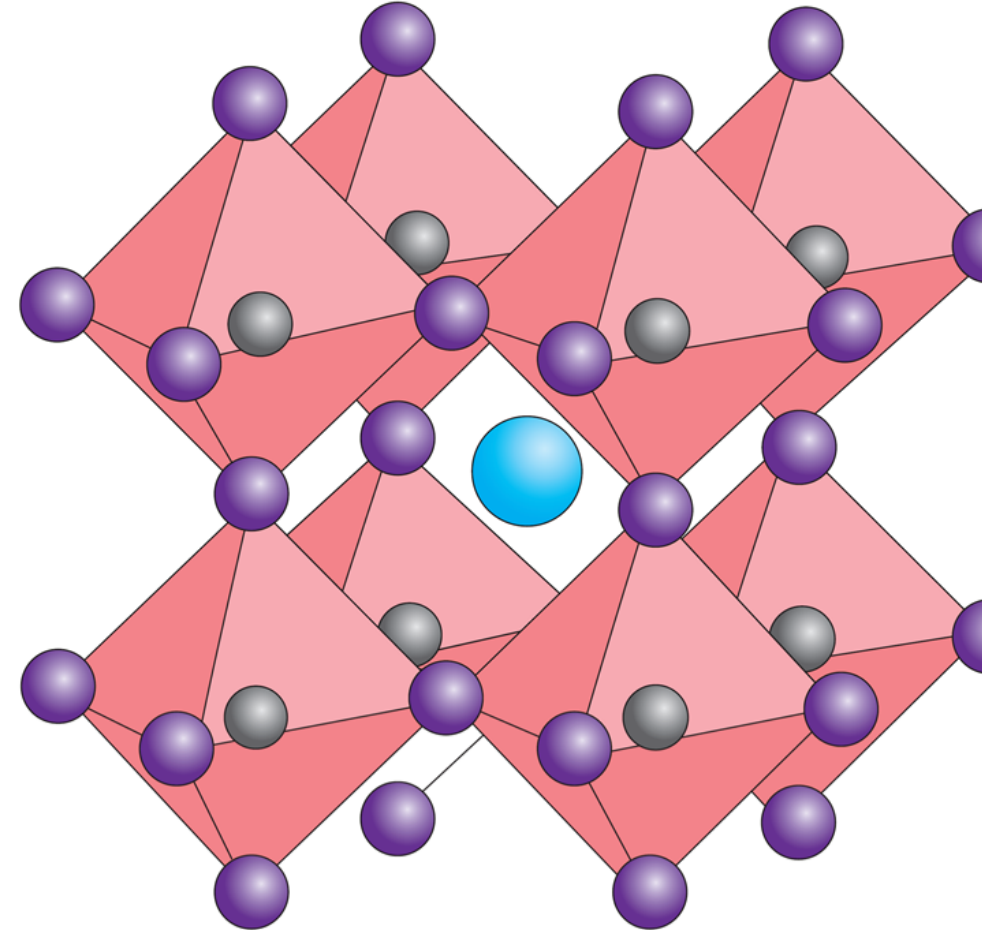


IRRADIATION OF PEROVSKITES SOLAR CELLS



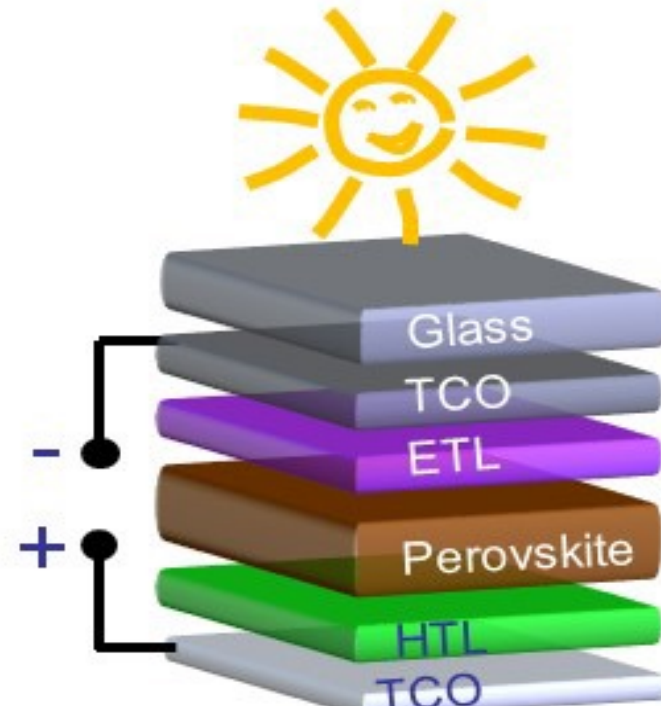
PEROVSKITE BASED SOLAR CELLS

- Metal halide perovskites are naturally occurring minerals.(MAPbI_3)
- 3rd generation of Solar cells
- Pros: Could be cheap, flexible, light, higher lifetime
- Cons: Unstable, degradable, lower efficiency



MATERIAL TYPE

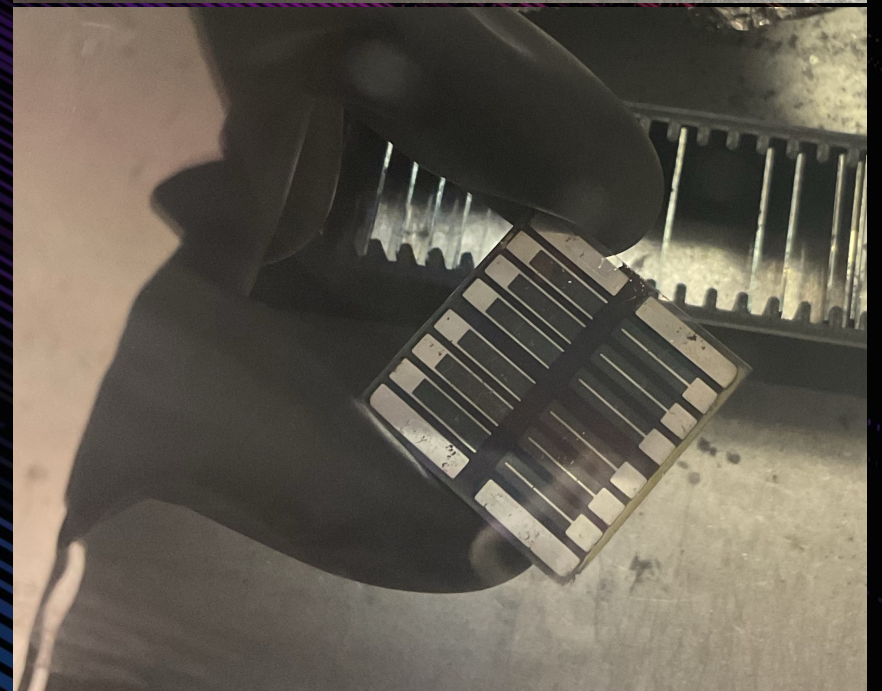
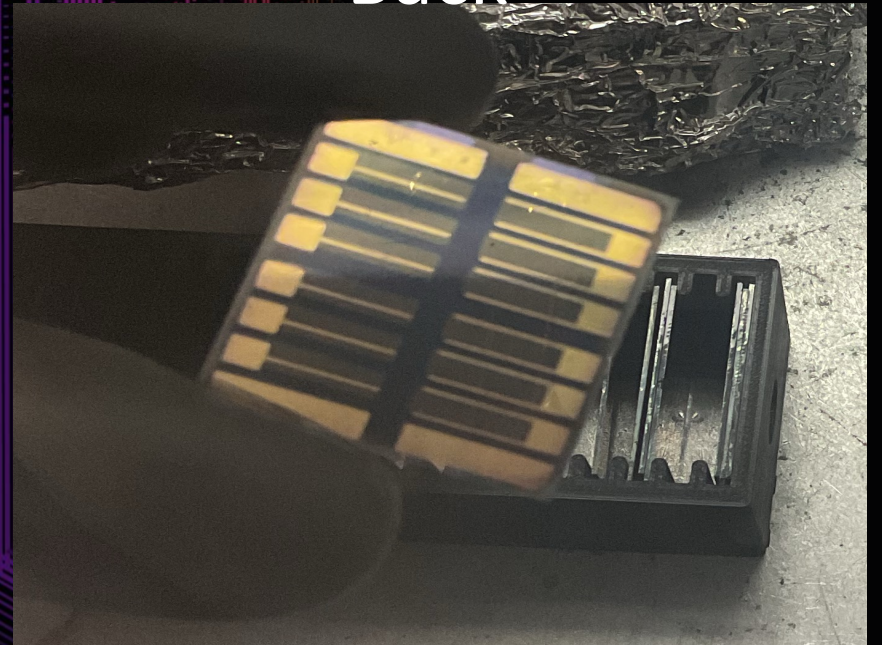
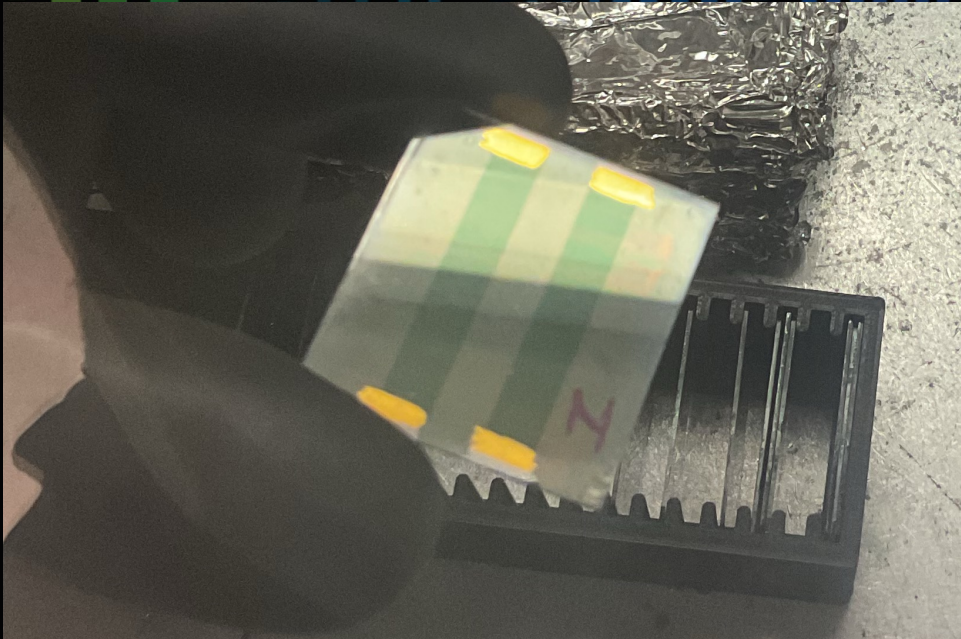
Semi-transparent: Glass/ITO (~120 nm)/NiO (15 nm)/Perovskite (blade coated, ~500 nm)/ LiF (0.8 nm)/C60 (15 nm)/(ZnO, 15 nm, optional)/ITO (70 nm)/Au or Ag grids (100 nm)



Front

SOLAR SAMPLE

Back



ENVIRONMENT





Section
S1102
S1102
S1102

FOY
OU
PINs 4 NIP

FOY
OU
PINs 4 NIP

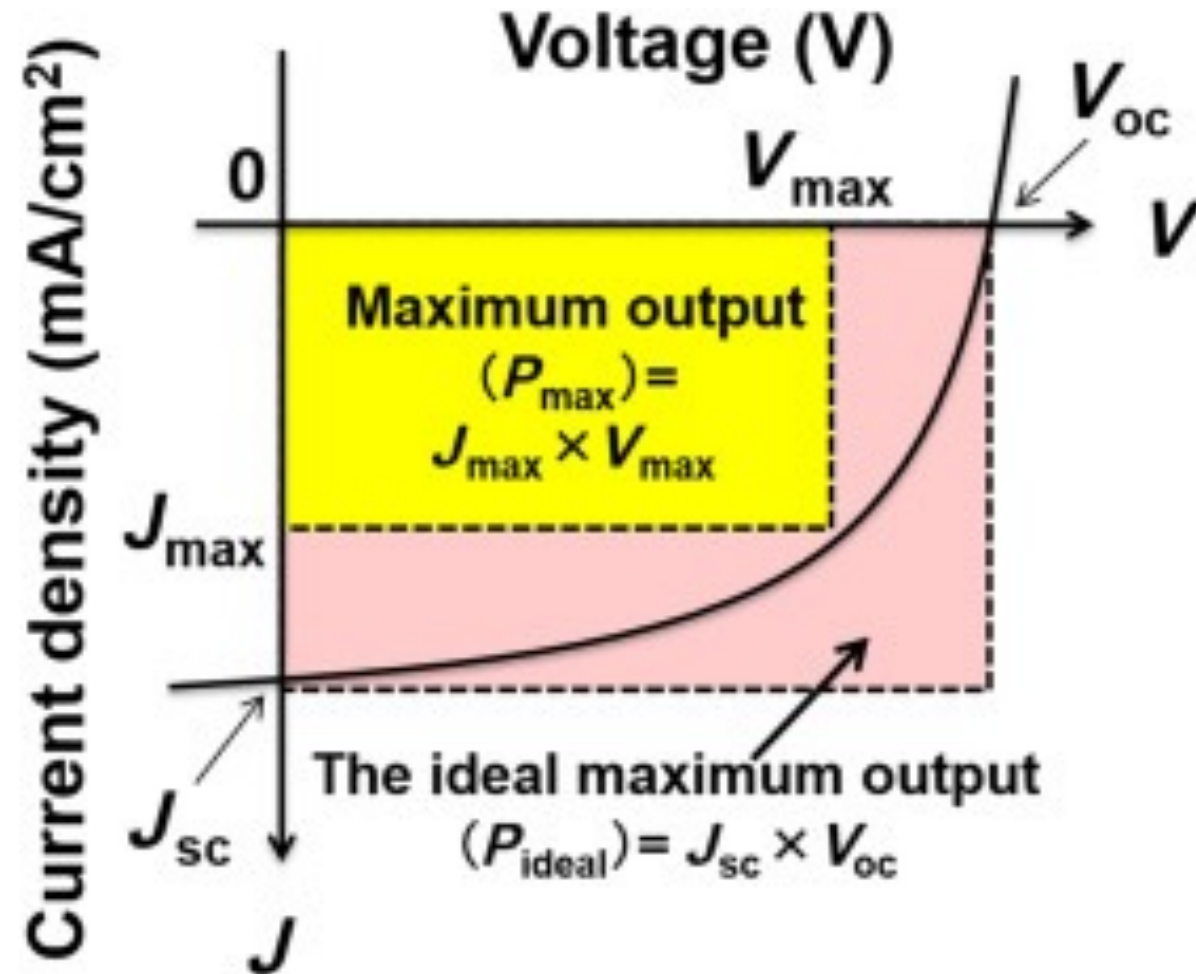
EDWARDS
Speedivalve
Made in Britain

PROTON IRRADIATION

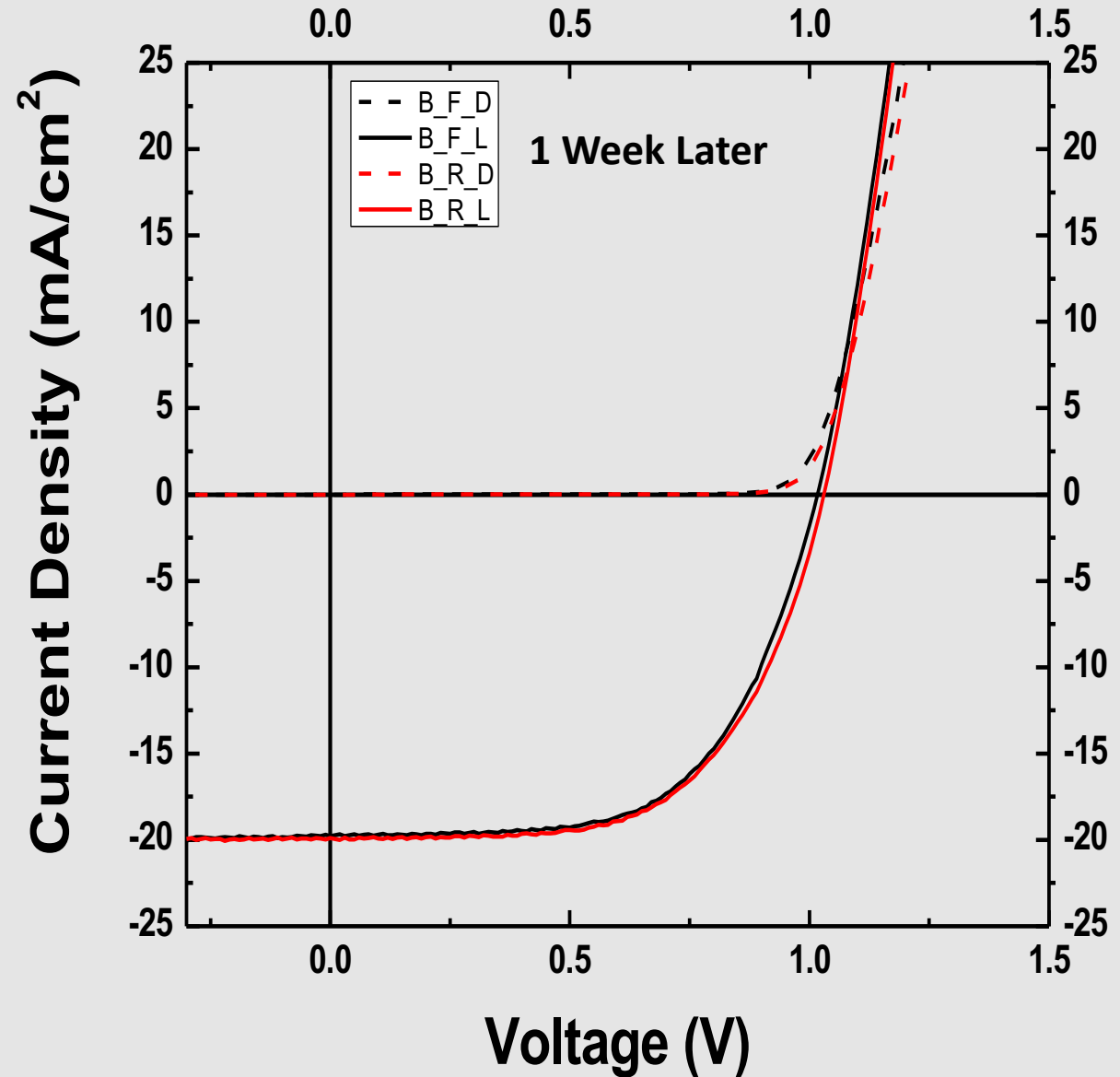
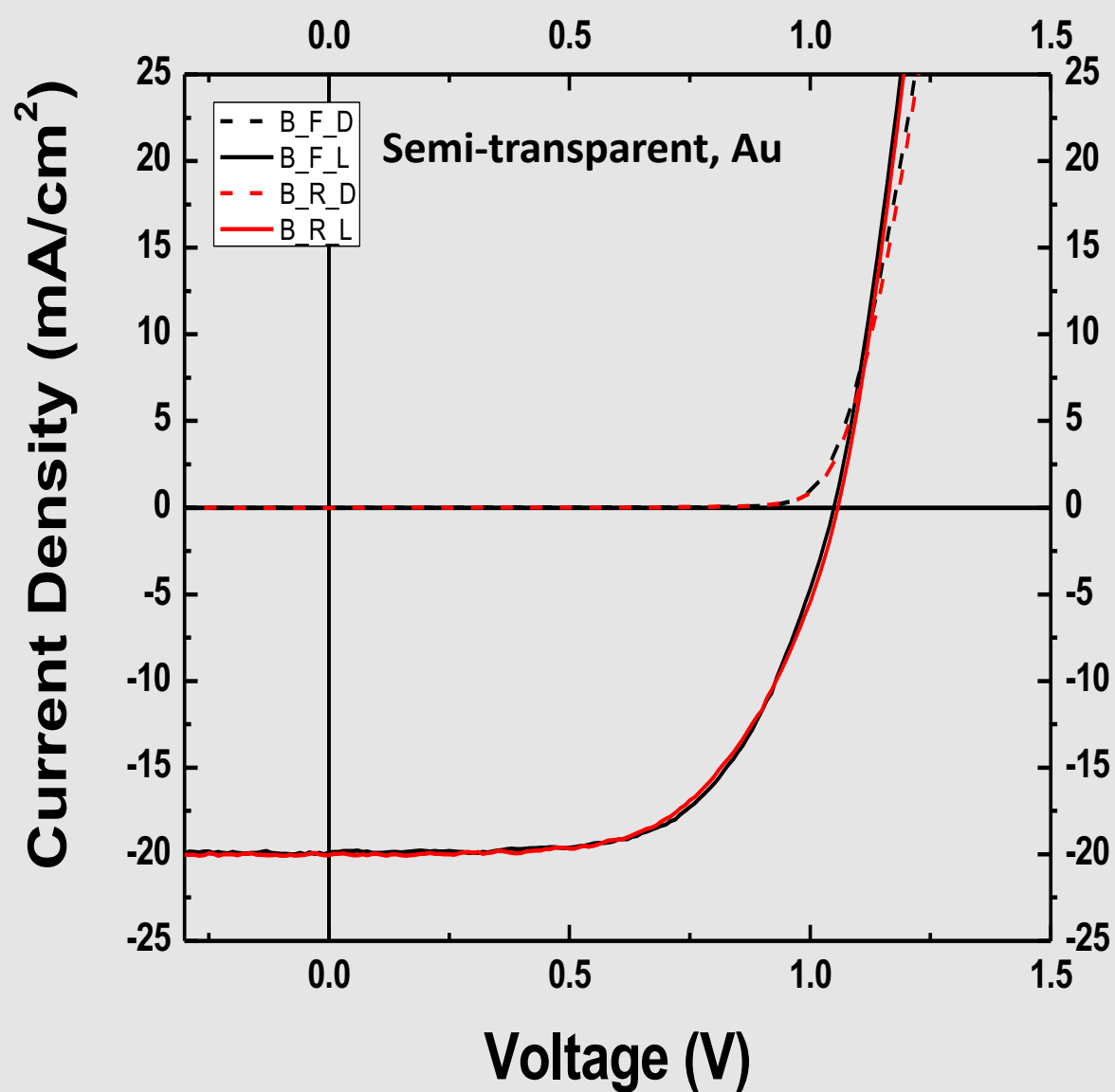
- Hitting the sample with protons with specific energy
- C (left): 45 keV and 10^{11} fluences, C (right): 45 keV and 10^{13} fluences
- D (left): 950 keV and 10^{13} fluences, D (right): 950 keV and 10^{11} fluences
- G: 45 keV and 10^{11} fluences
- H: 45 keV and 10^{13} fluences

Values we're interested in

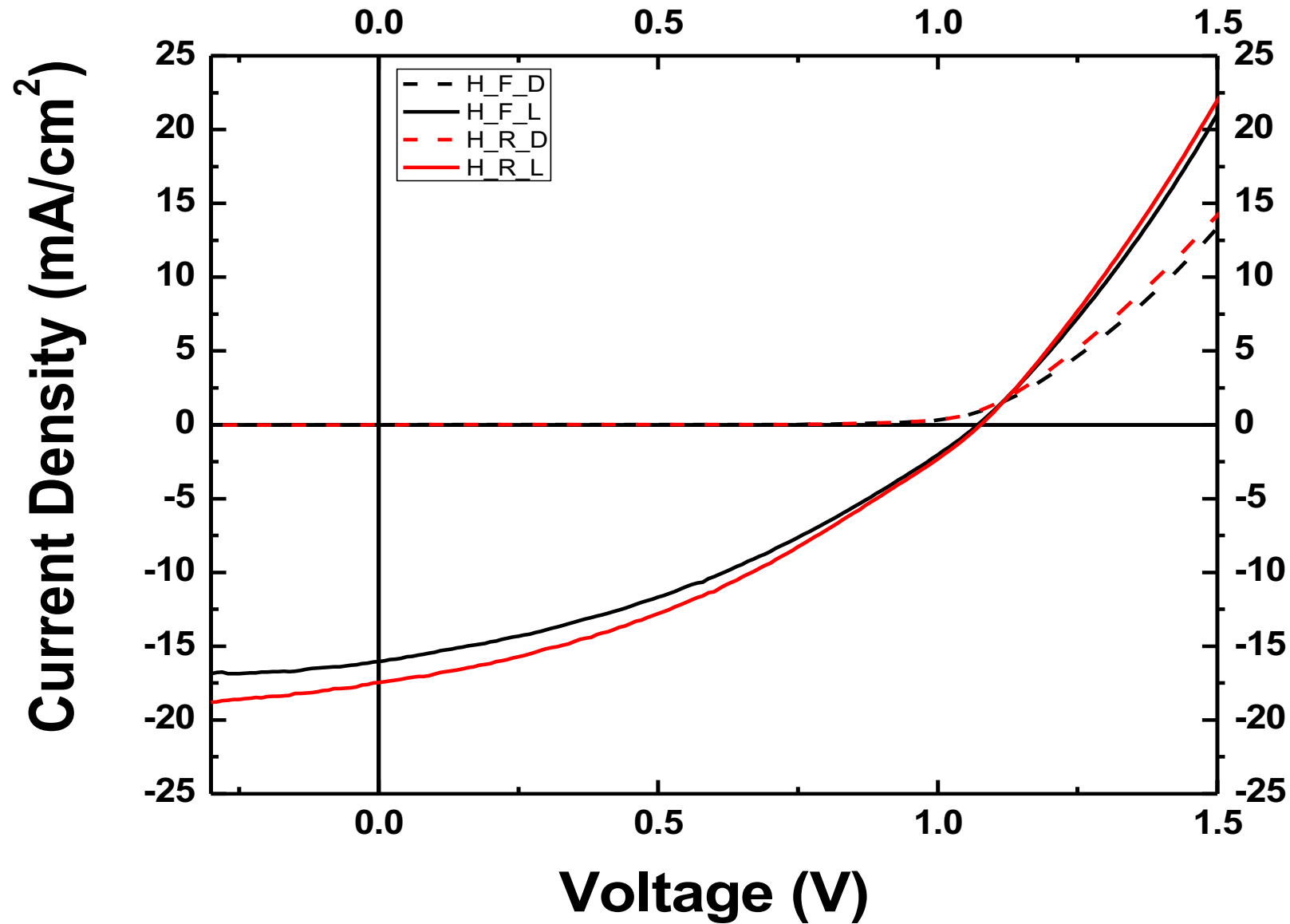
- J_{sc} (Current density in a short circuit)
- V_{oc} (Voltage in an open circuit)
- V_{max} (Maximum voltage)
- J_{max} (Maximum current density)
- P_{max} (Maximum power)
- FF (Fill Factor)
- Efficiency



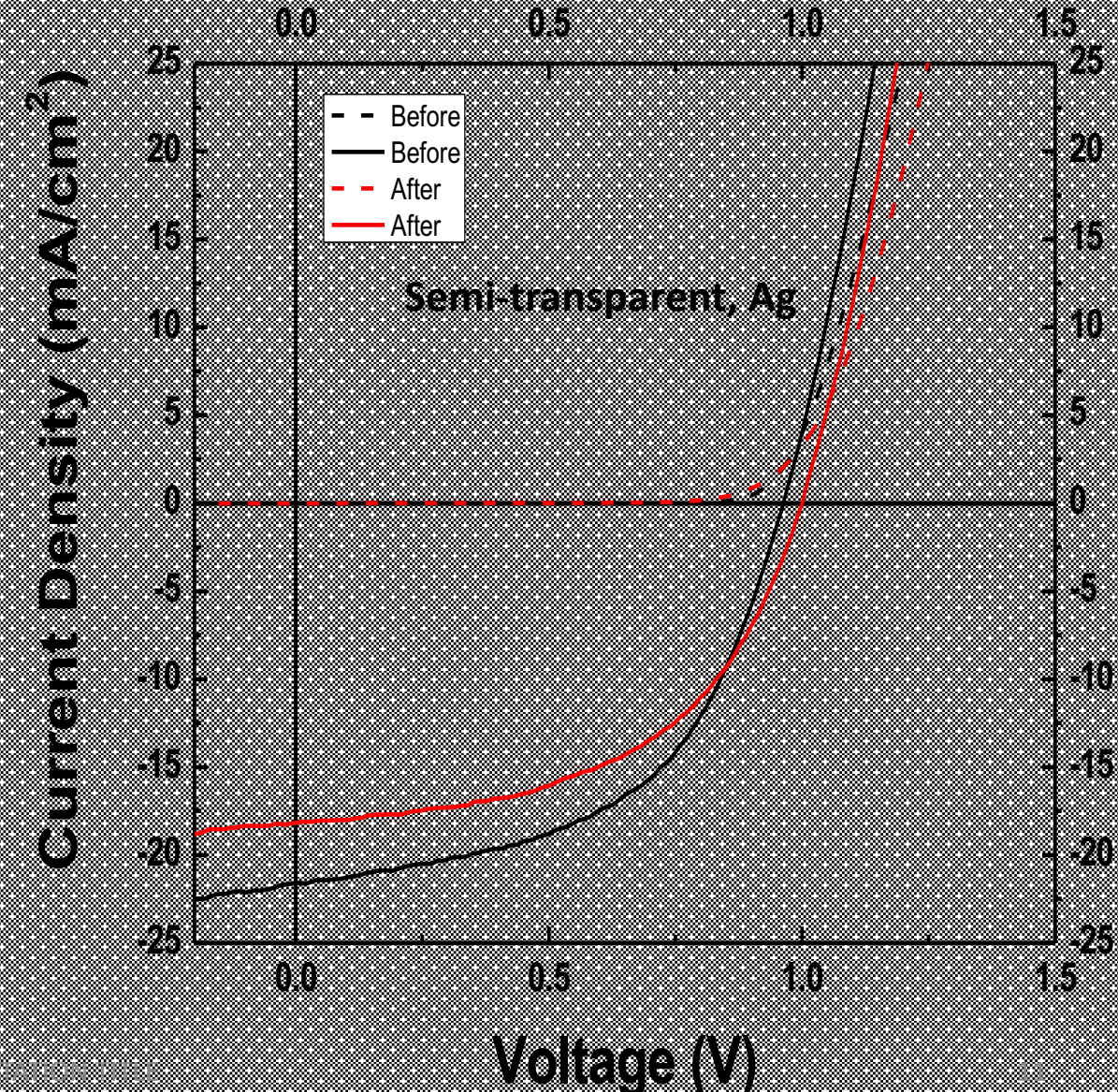
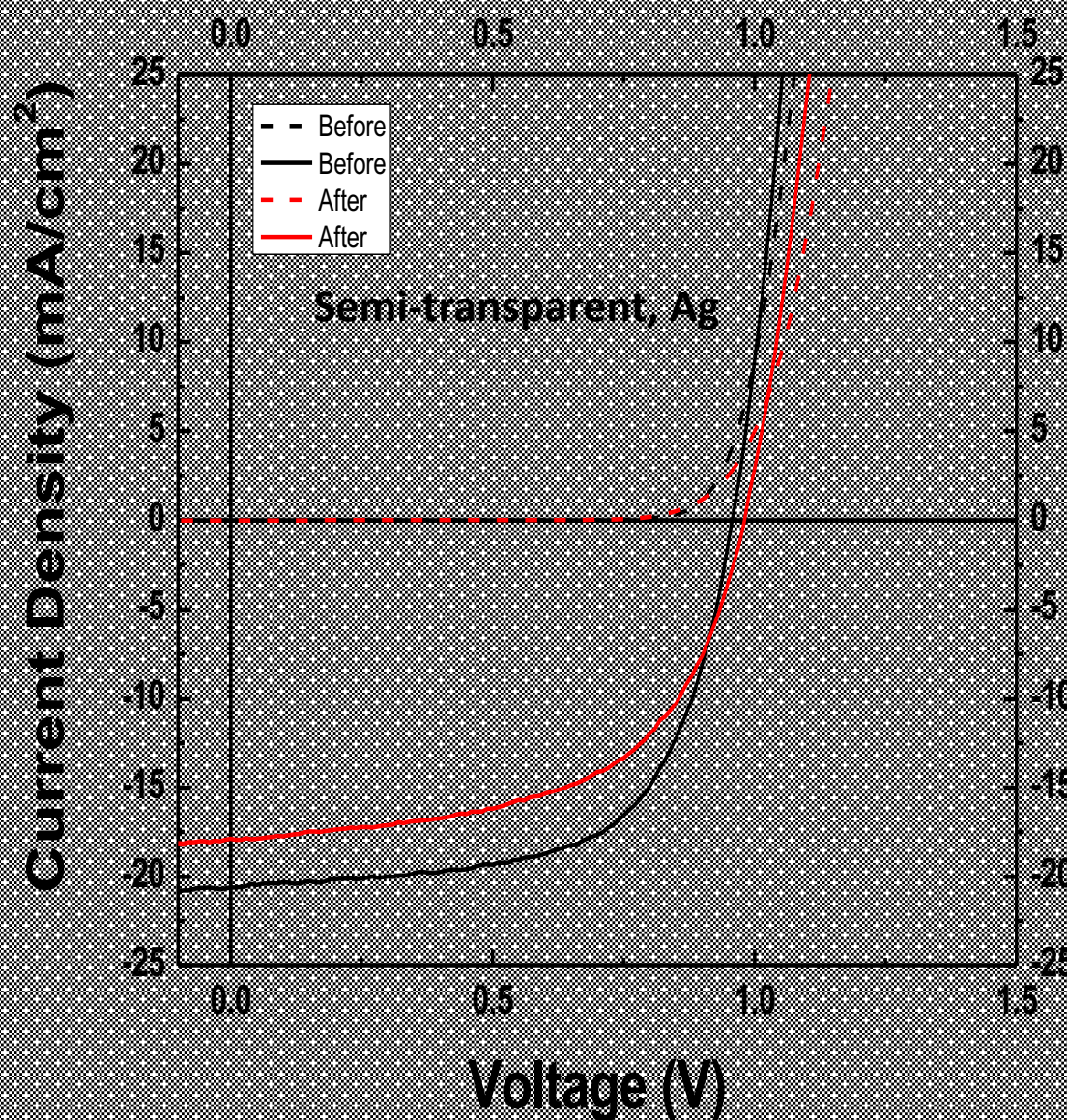
Current Density vs. Voltage (J-V) graph



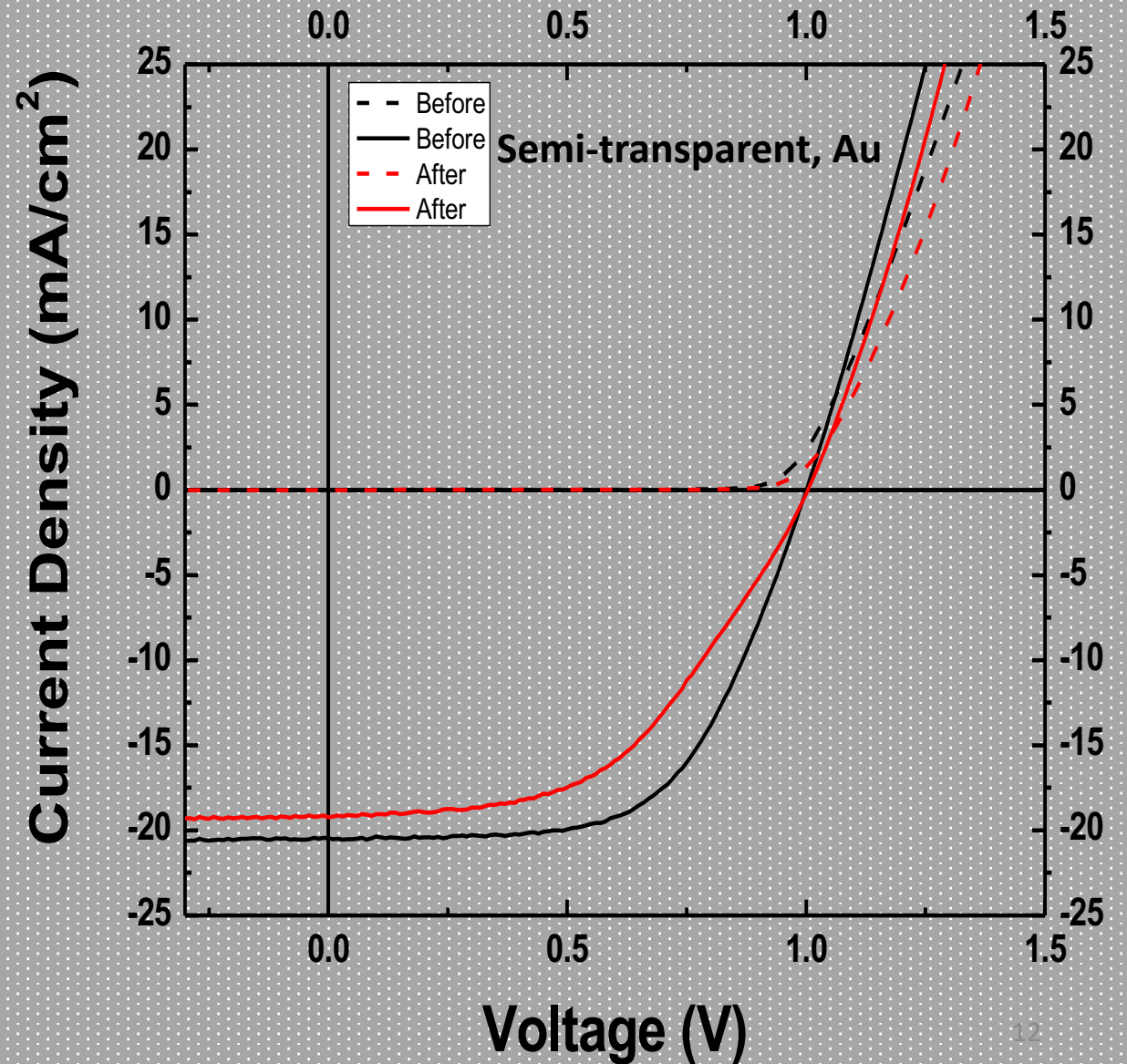
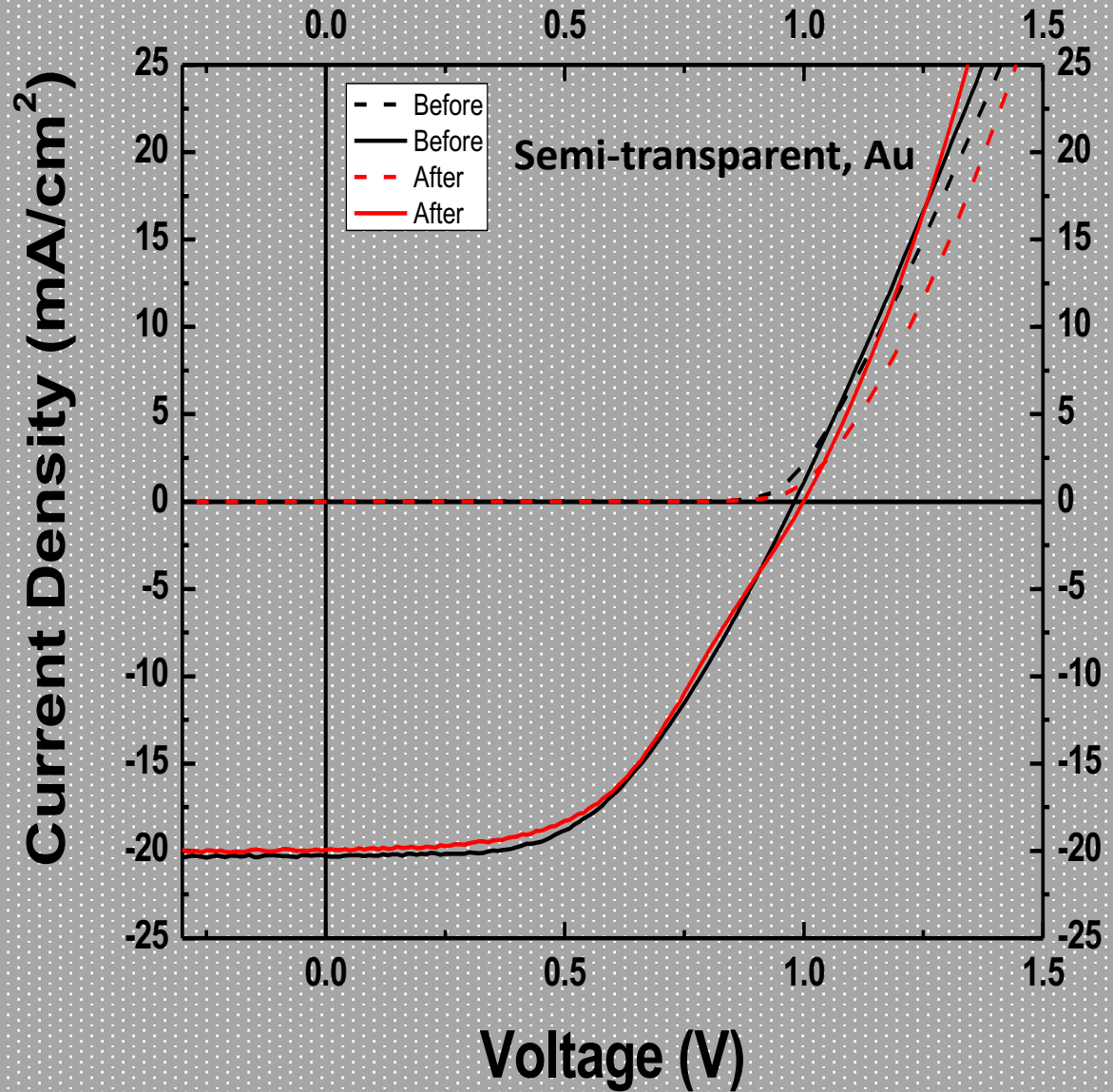
Current Density vs. Voltage (J-V graph)



Before and after Irradiation



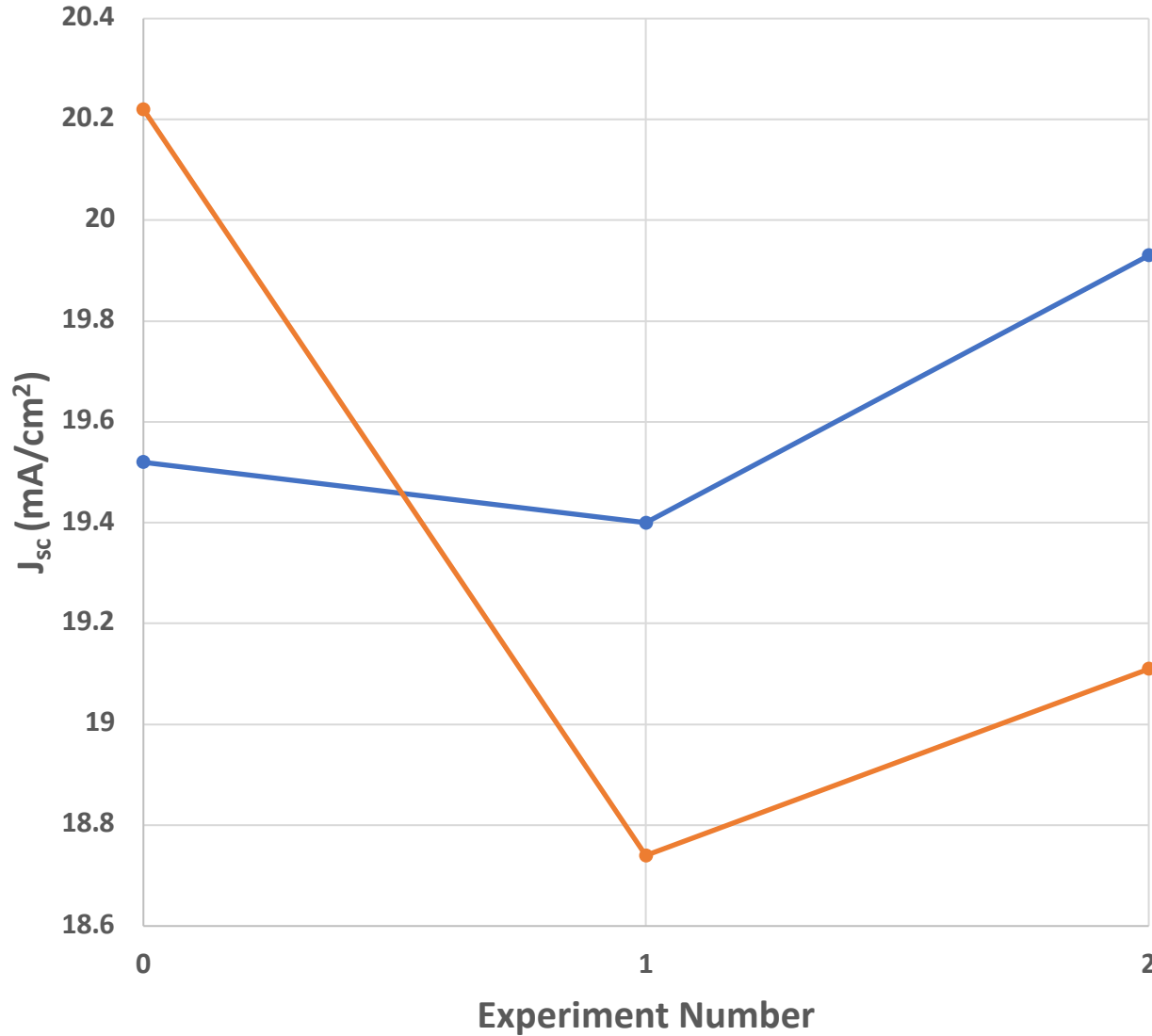
Before and after Irradiation



CHANGE IN J_{sc}

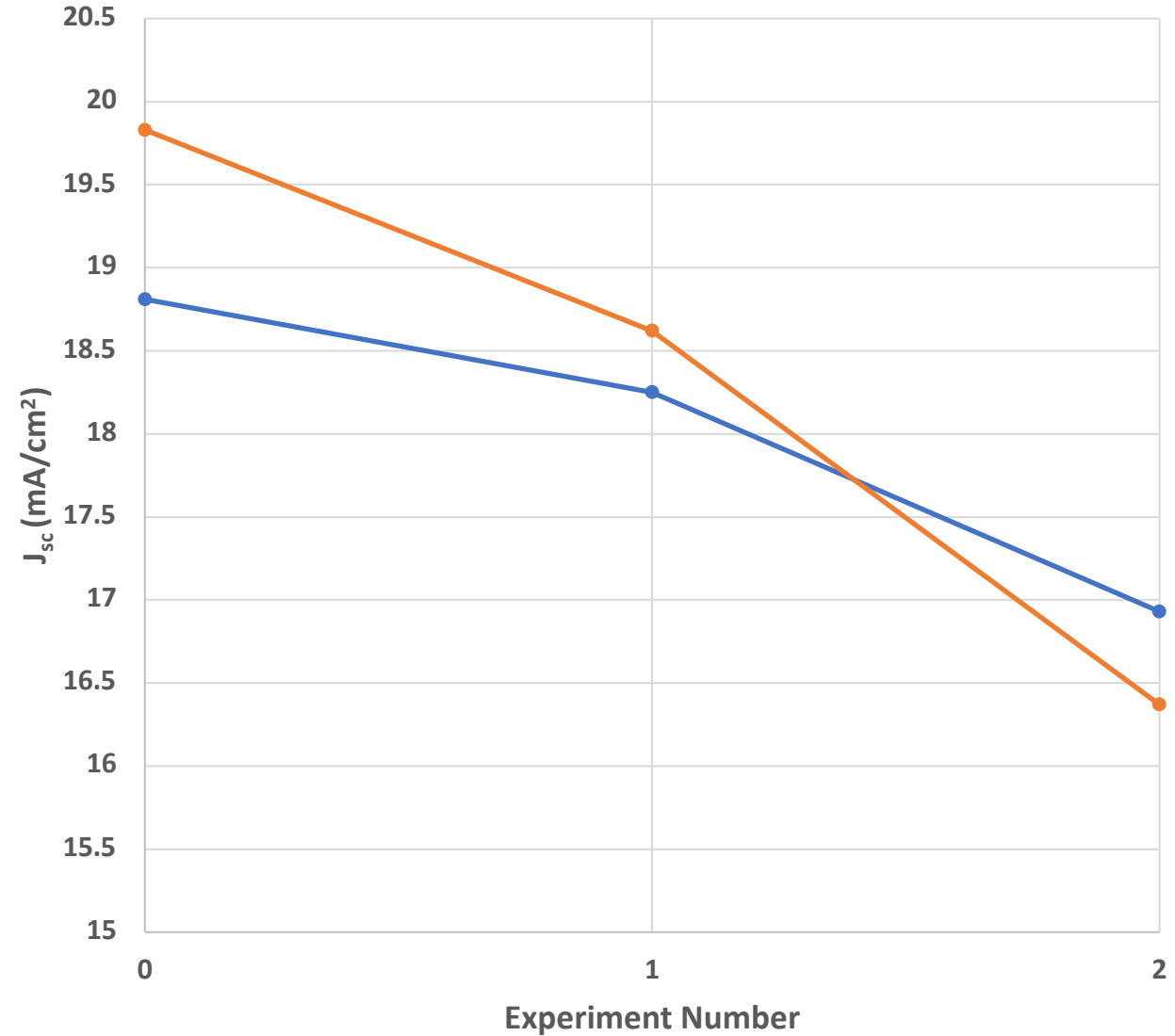
Semi-transparent, Ag

● 45 keV, e11 fluences ● 45 keV, e13 fluences



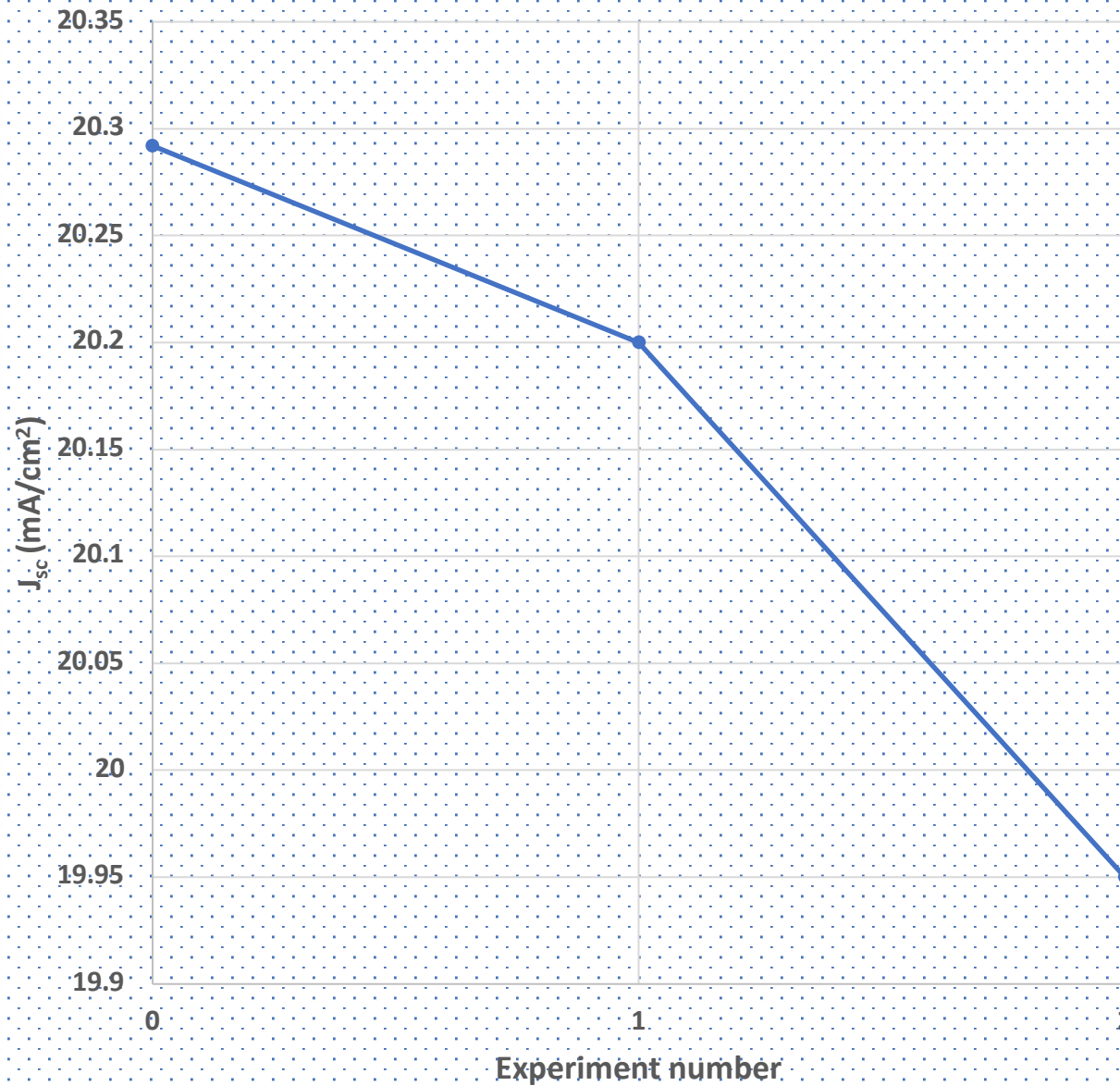
Semi-transparent, Ag

● 950 keV, e13 fluences ● 950 keV, e11 fluences

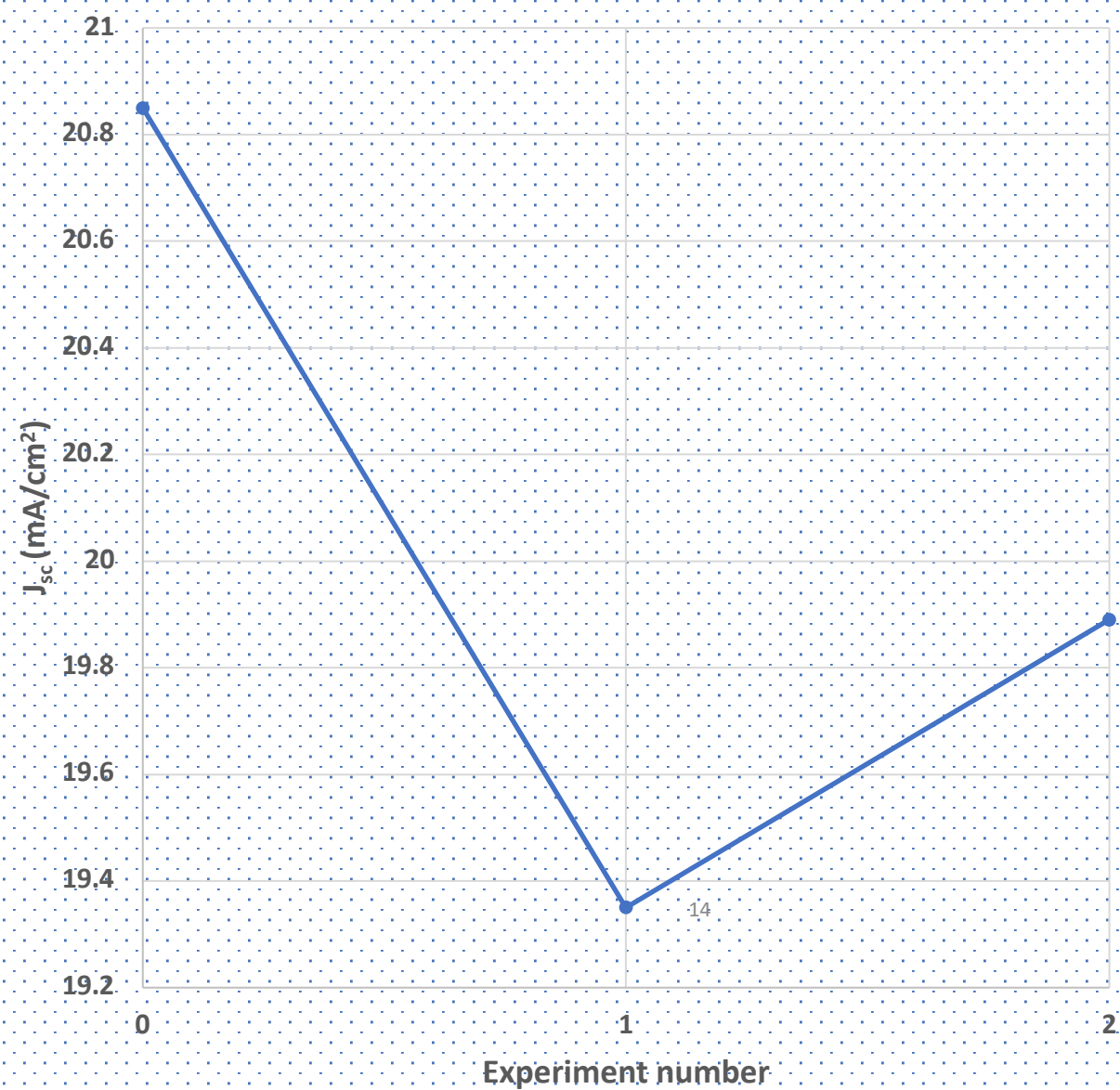


CHANGE IN J_{sc}

Semi-transparent, Au (45 keV, 10^{11})



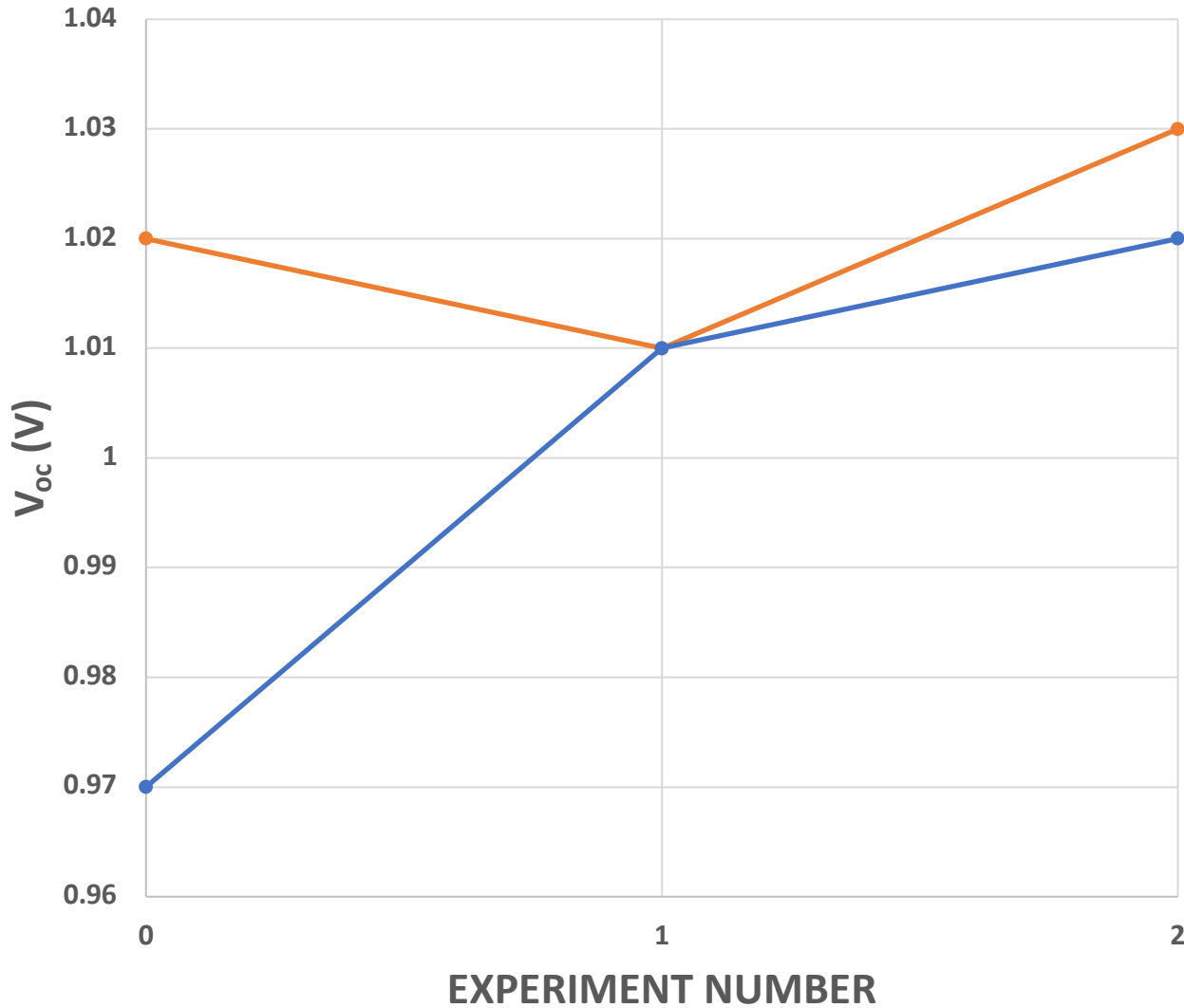
Semi-transparent, Au (45 keV, 10^{13})



CHANGE IN V_{OC}

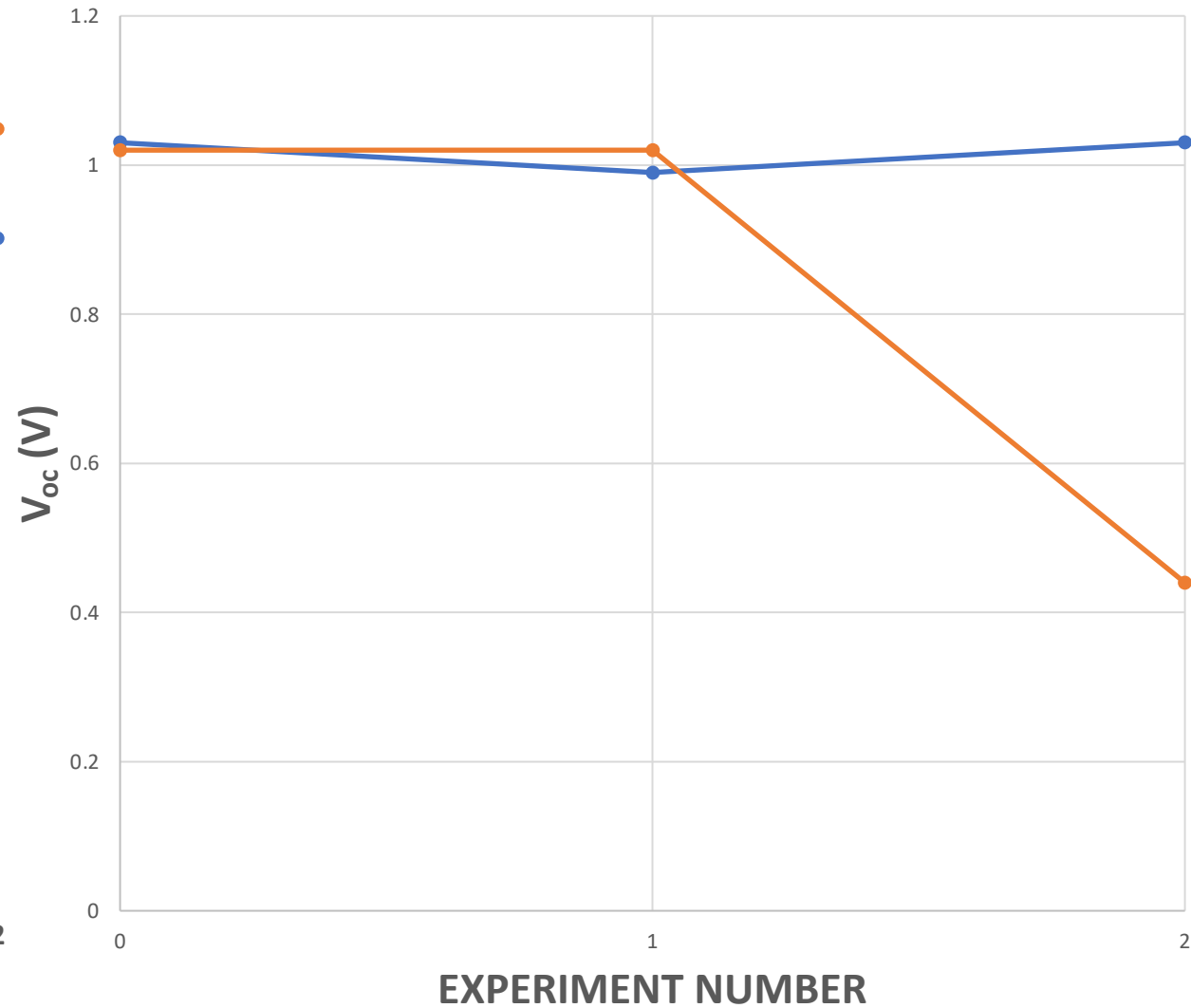
Semi-transparent, Ag

—●— 45 keV, e13 fluences —●— 45 keV, e11 fluences



Semi-transparent, Ag

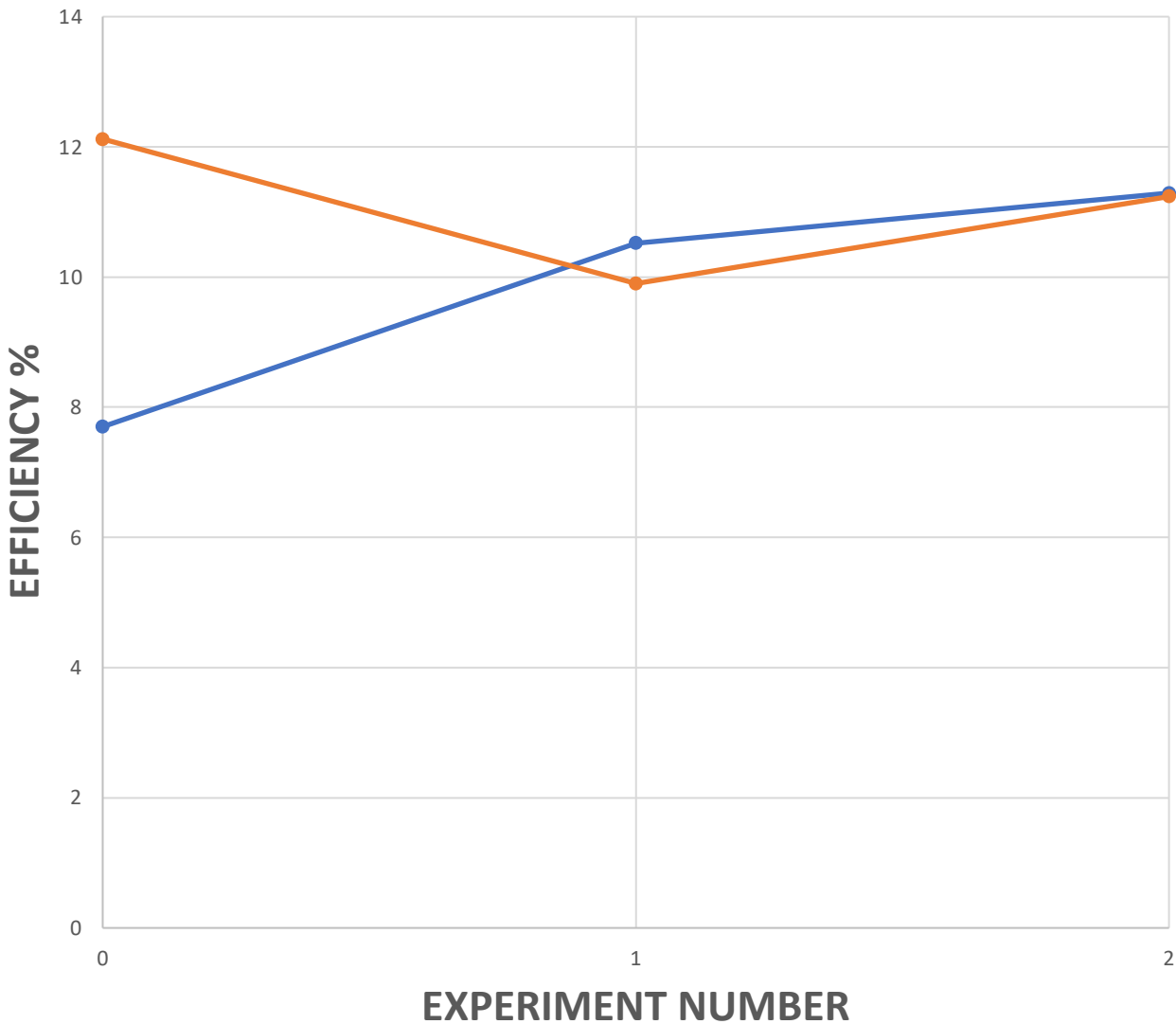
—●— 950 keV, e13 fluences —●— 950 keV, e11 fluences



CHANGE IN EFFICIENCY

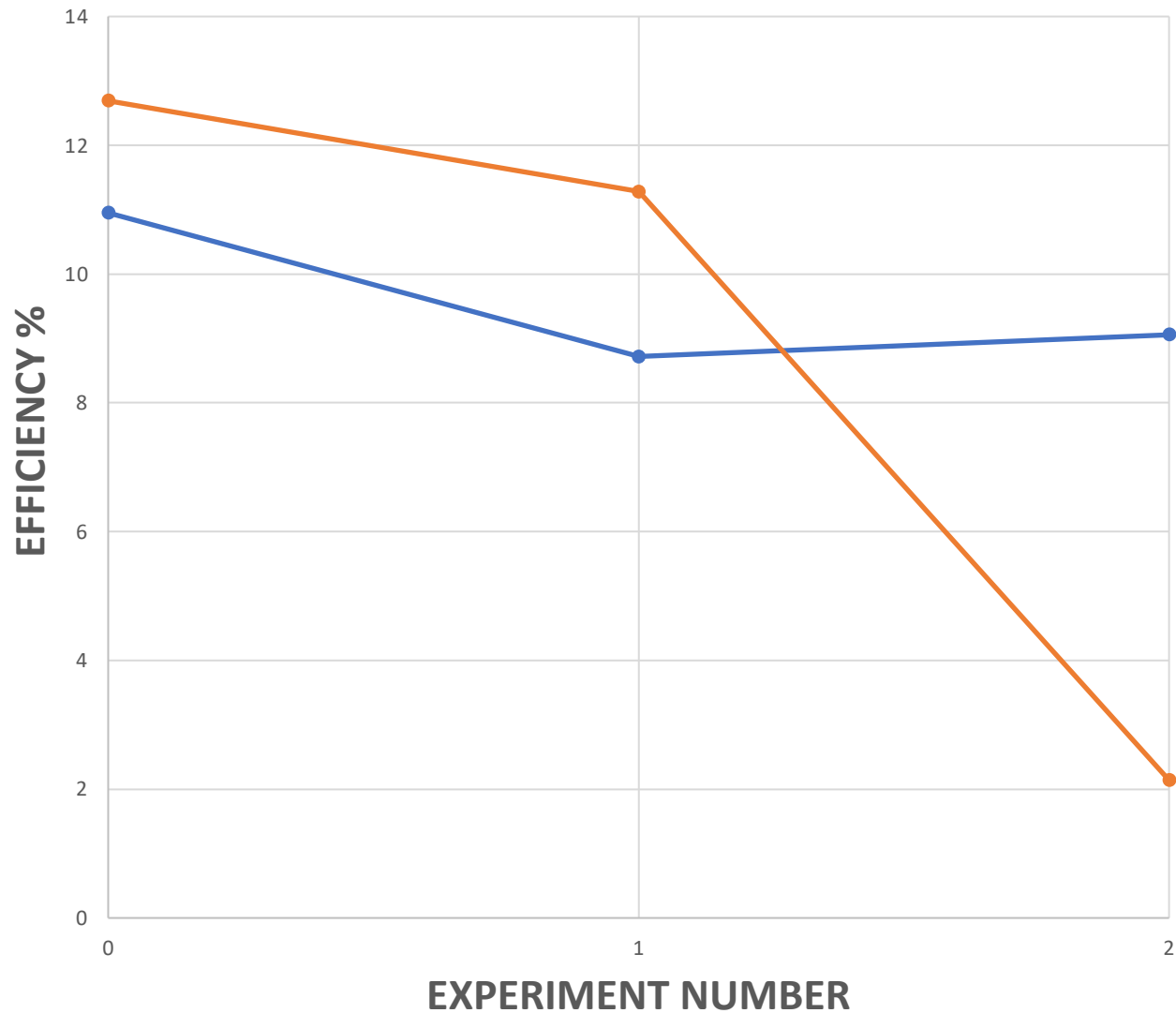
Semi-transparent, Ag

● 45 keV, e11 fluences ● 45 keV, e13 fluences



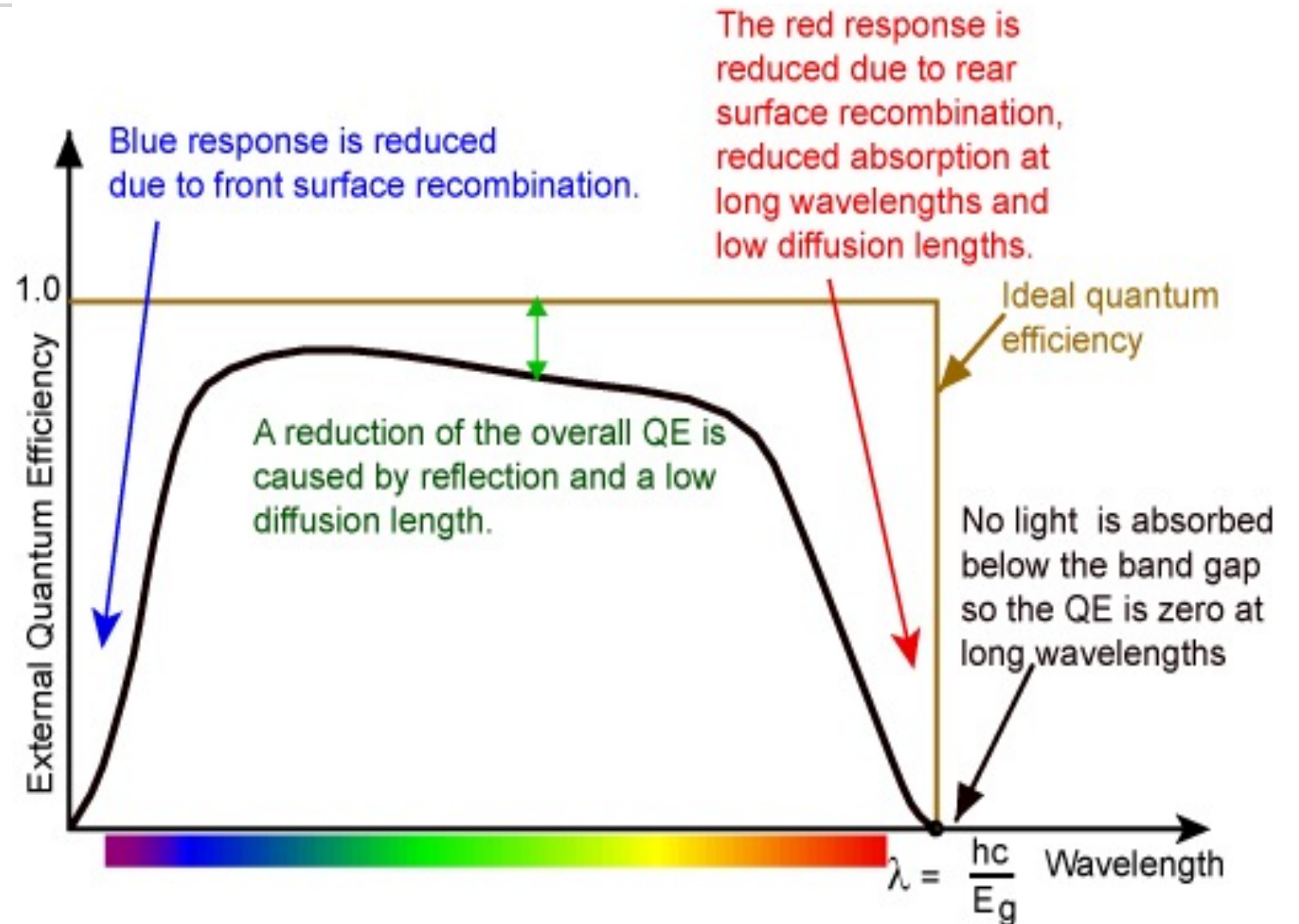
Semi-transparent, Ag

● 950 keV, e13 fluences ● 950 keV, e11 fluences

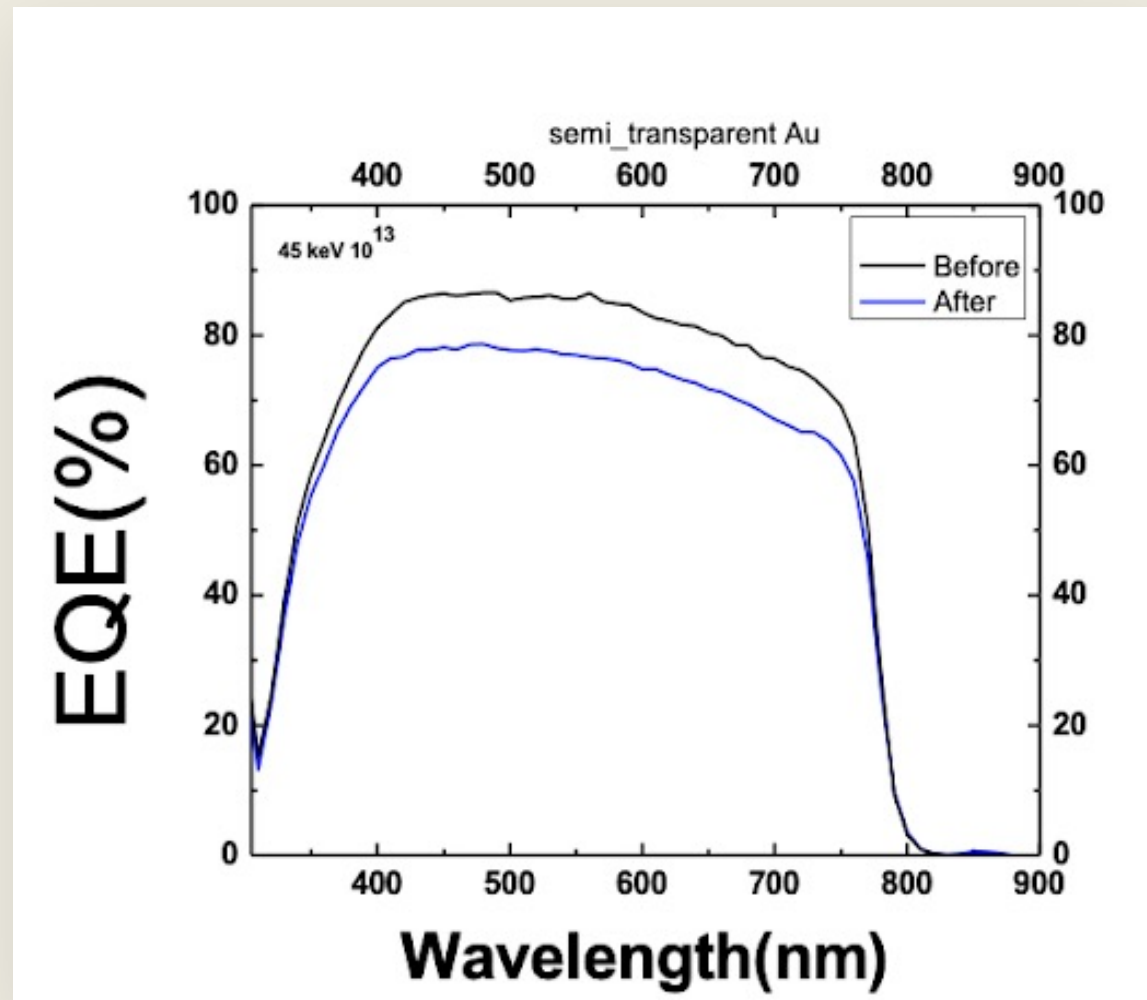
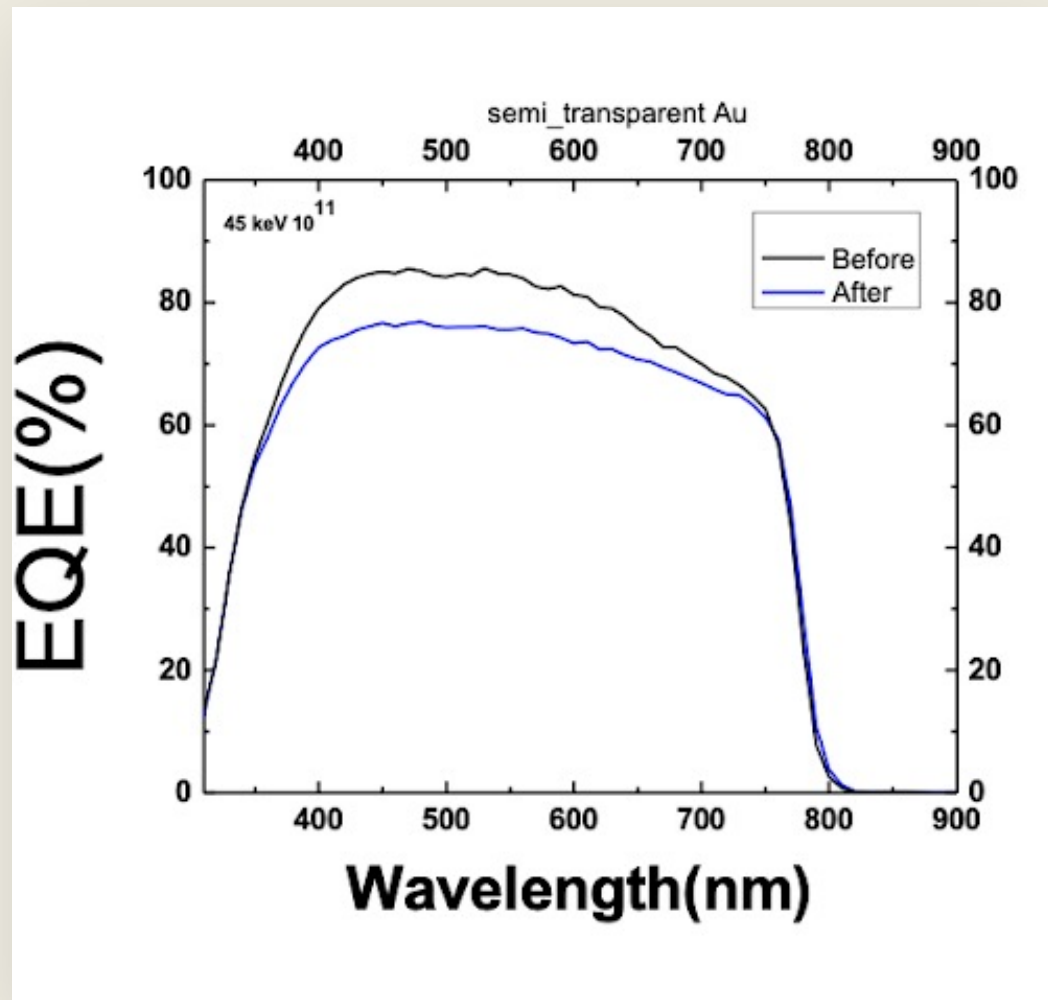


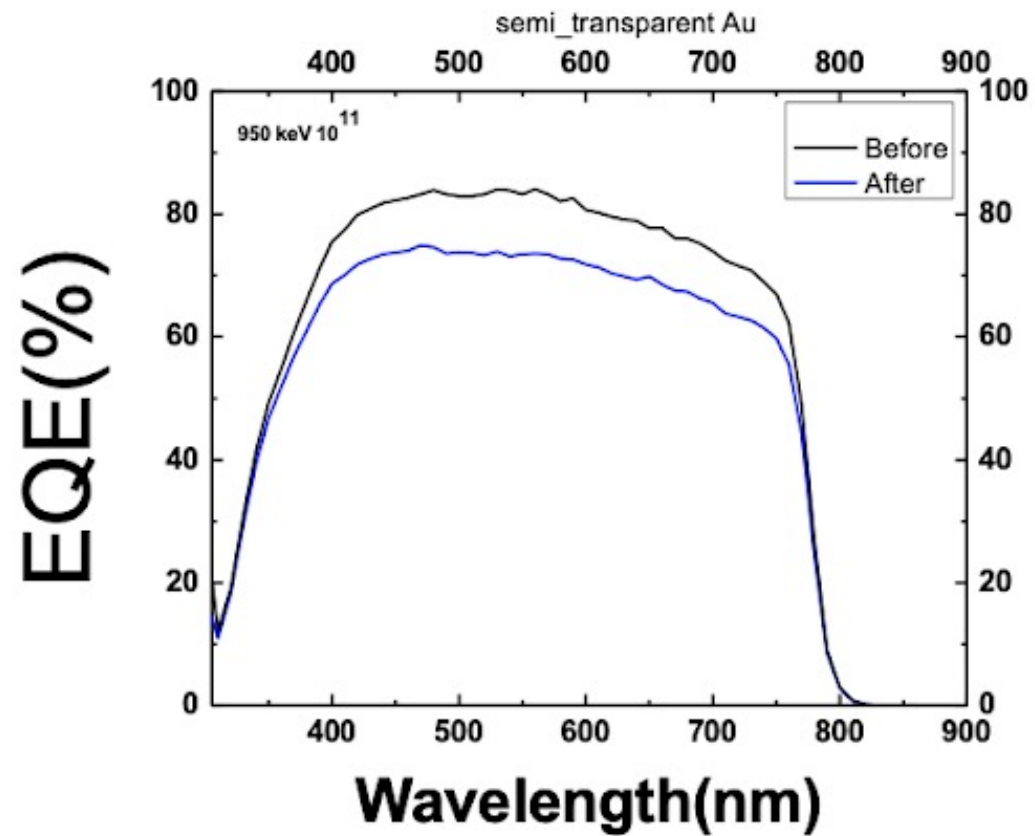
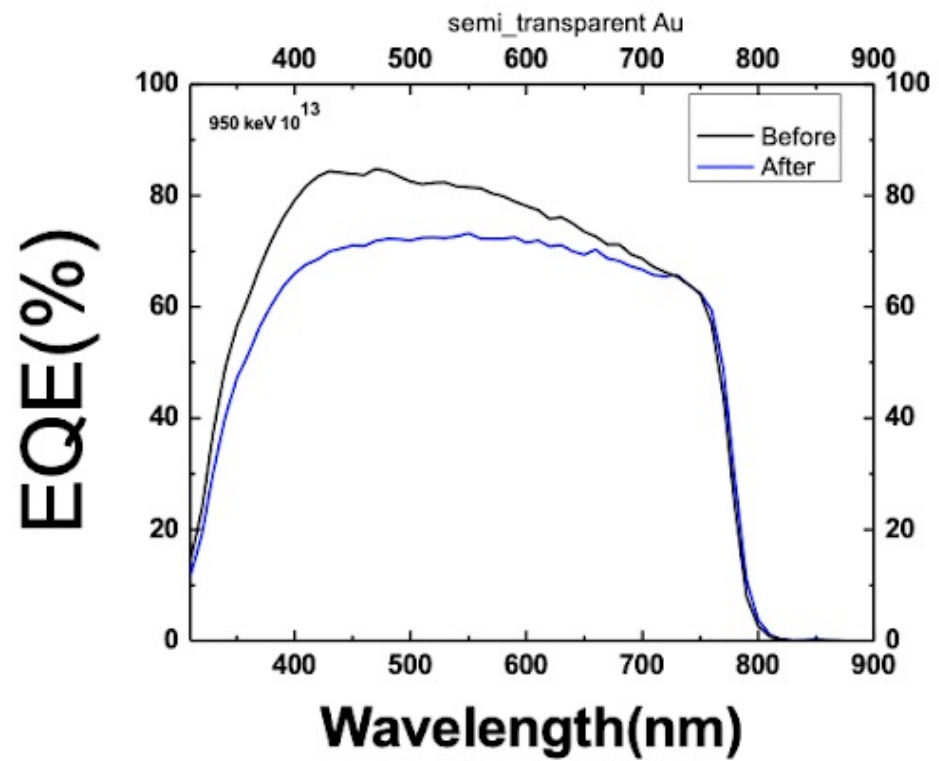
EXTERNAL QUANTUM EFFICIENCY (EQE)

Band Gap: The minimum energy required to cross over to the conduction band



EQE GRAPHS





References

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- www.imec-int.com