

Research Unit:

Photovoltaics (IEK-5)

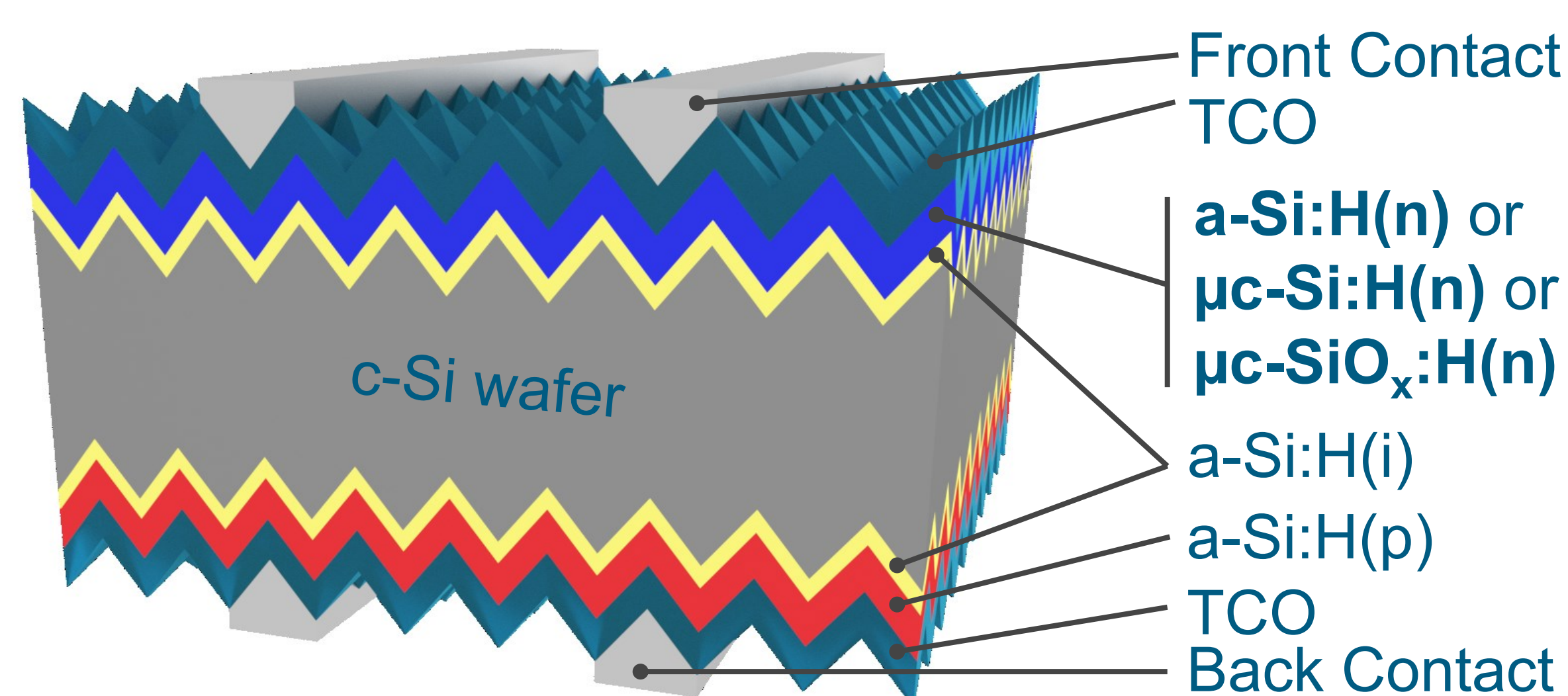
Program:
Renewable Energies

Topic:
Solar Cells of the Next Generation

M. Köhler, M. Pomaska, W. Duan, A. Richter, A. Zamchiy, H. Li, K. Ding, F. Finger and U. Rau

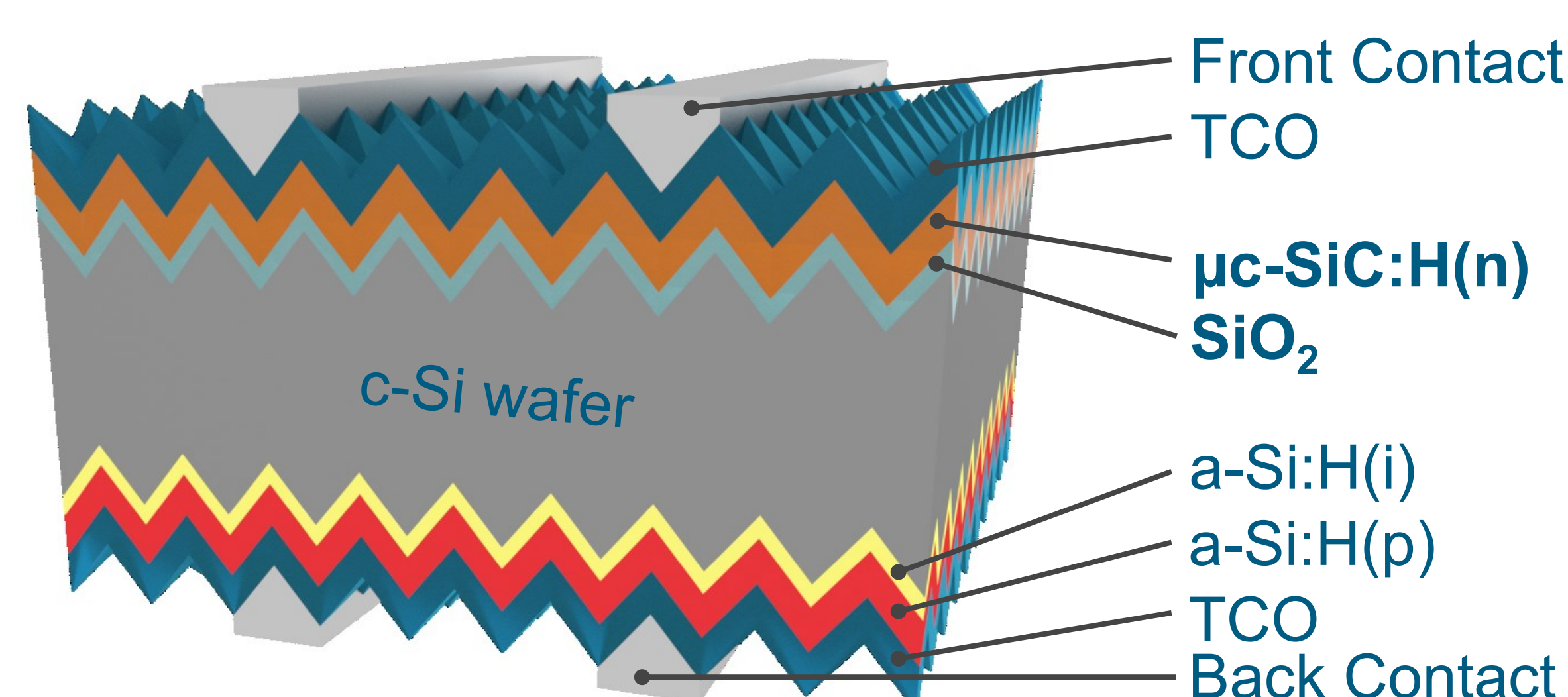
Novel Silicon Thin-Film Alloys in High Efficiency Silicon Heterojunction Solar Cells

Silicon Heterojunction

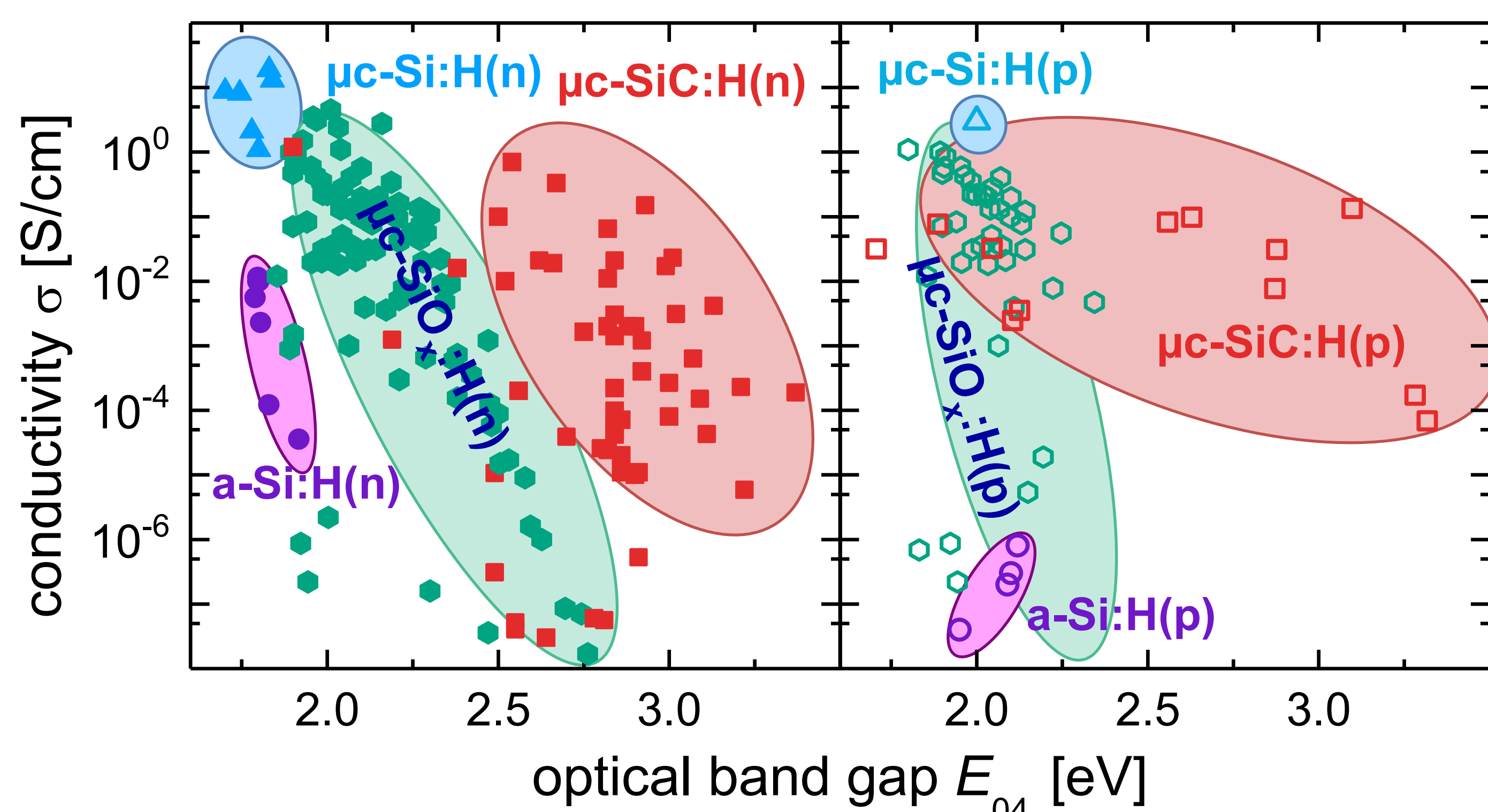


CONCEPTS

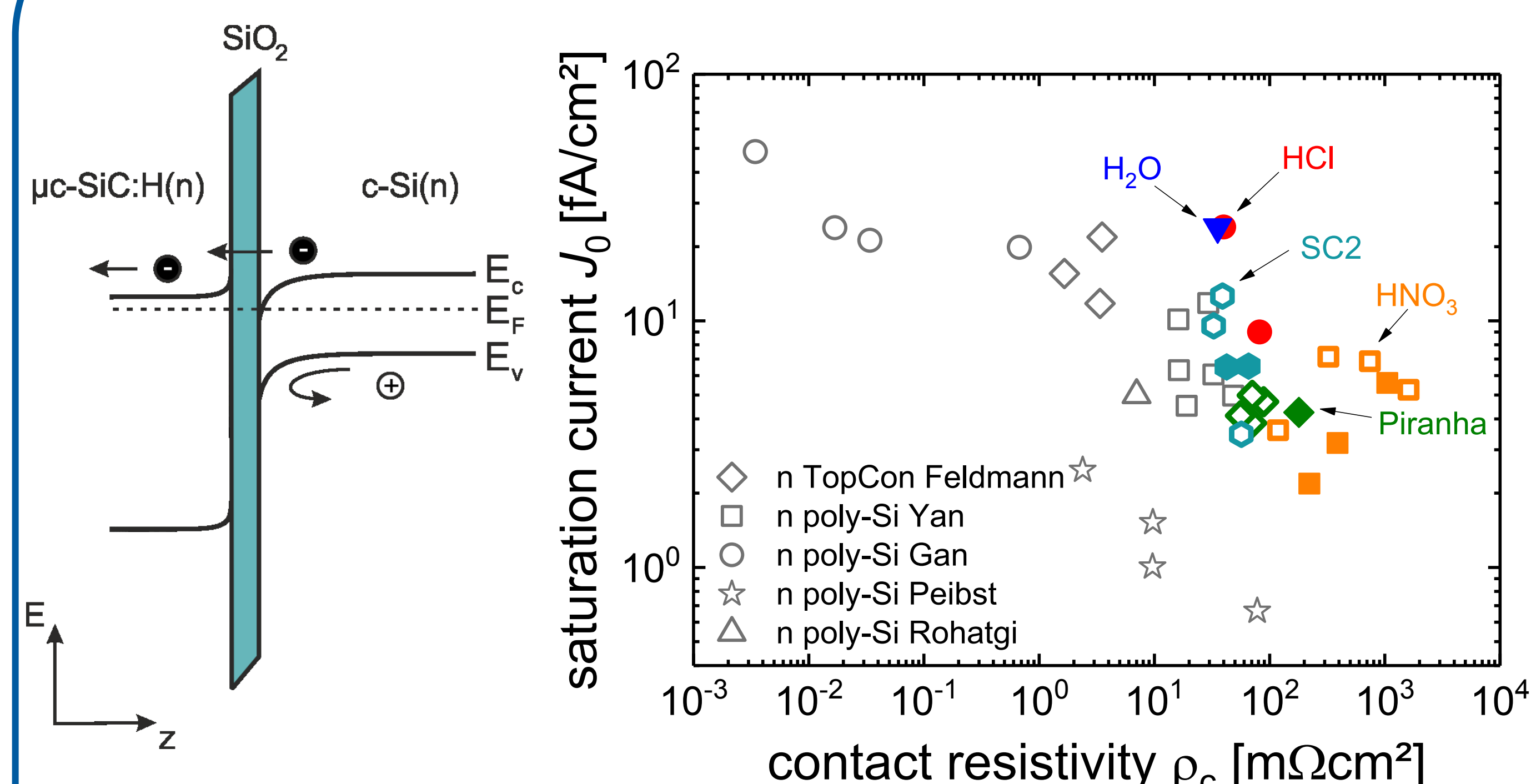
Transparent Passivated Contact



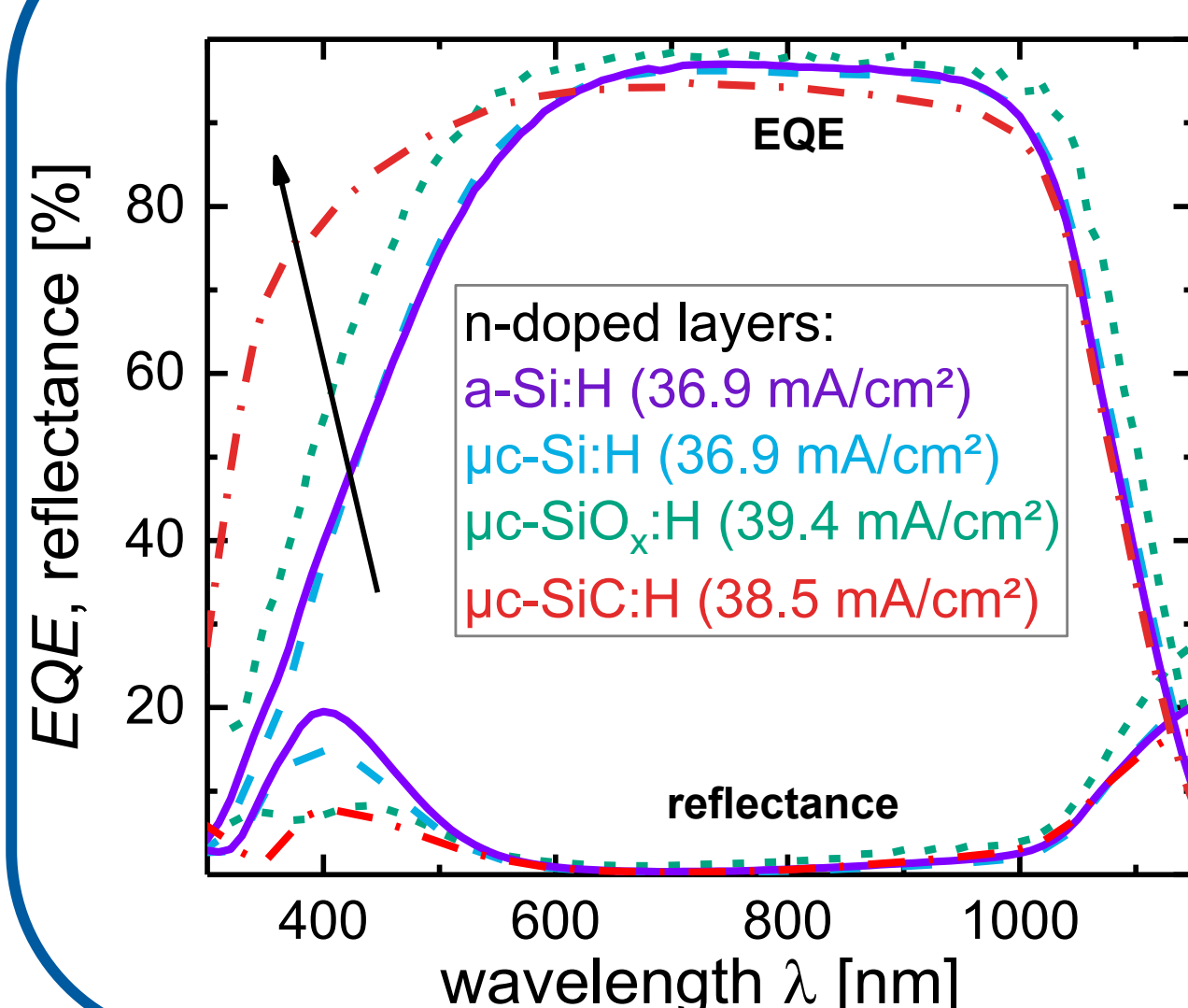
ELECTROOPTICAL PROPERTIES



TRANSPARENT PASSIVATED CONTACT



CELL RESULTS



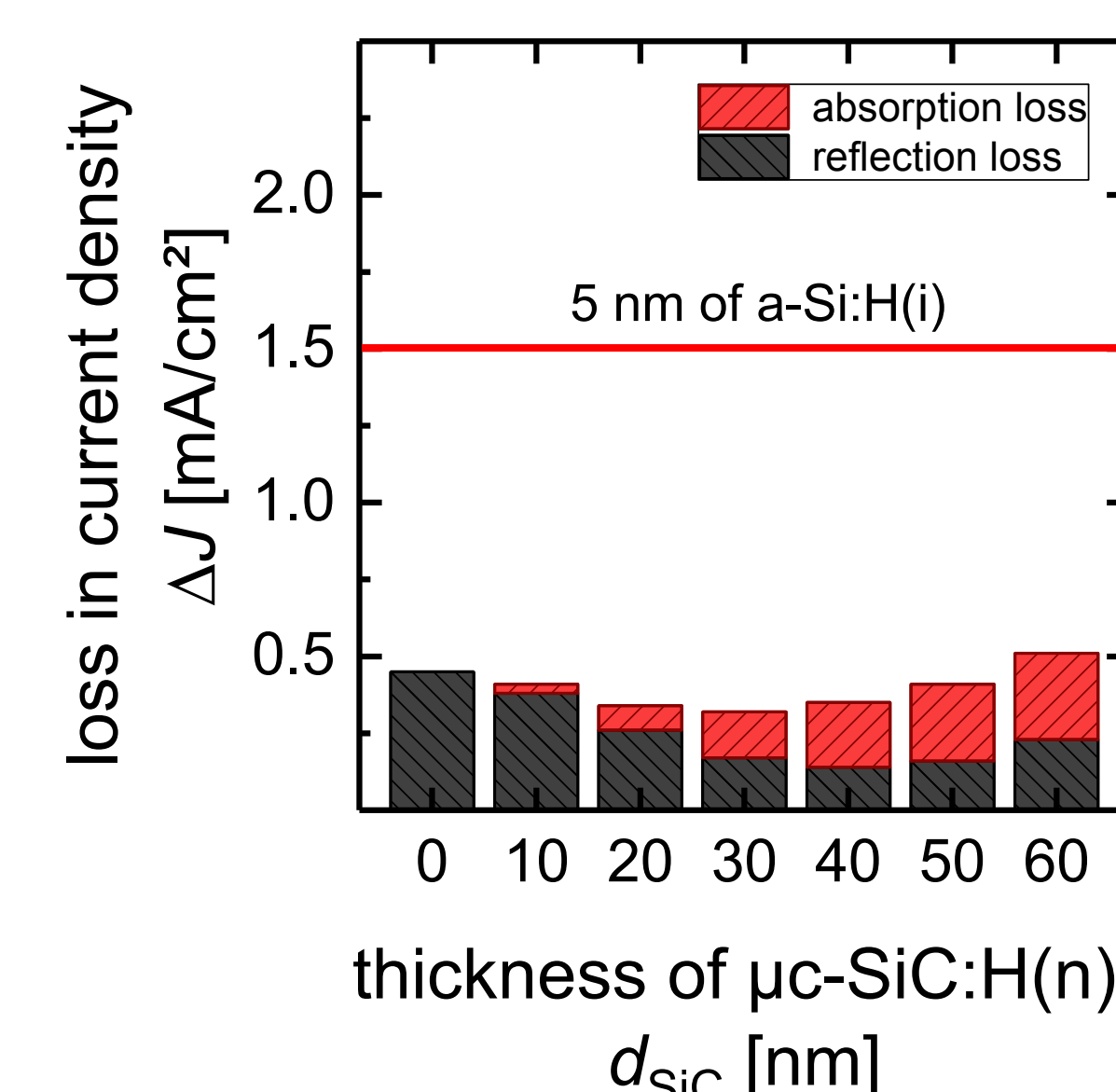
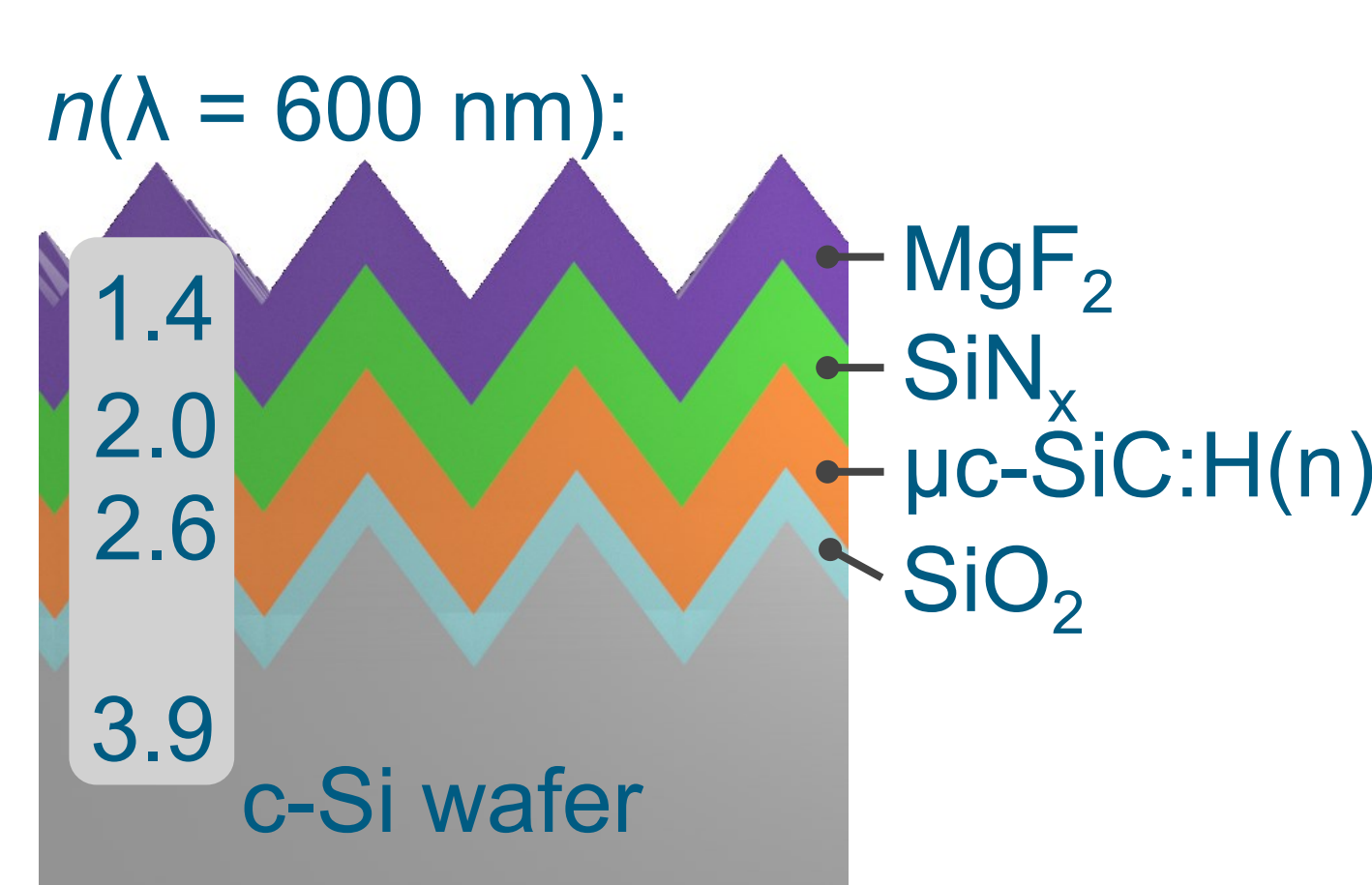
	J_{sc} [mA/cm²]	V_{oc} [mV]	FF [%]	η [%]
a-Si:H	36.4	727	79.4	21
μc-Si:H	36.5	719	76.8	20.1
μc-SiO _x :H	36.2	721	75.4	19.7
μc-SiC:H	35.8	669	75	18

Further activities on Tunnel Oxides:

Composition:
AR-XPS (JOSEPH)
Simulations

Pinholes:
c-AFM (JOSEPH)

TRANSPARENT FRONT SITE FOR IBC



CONCLUSIONS

- μc-SiC:H and μc-SiO_x:H are highly tunable materials with excellent optoelectronic properties
- No high temperature steps or annealing involved
- Fast improvements due to SHJ baseline (MARIA)
- Deeper understanding of principles Characterization Cluster (JOSEPH)

- Decoupling of electrical and optical optimization for IBC
- Refractive index grating → low reflection