

STANFORD
UNIVERSITY



King Abdullah University of
Science and Technology



Molecular Photovoltaics as a Low-Cost Renewable Energy Source

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Technological mission

Revolutionize the global energy landscape by developing the science and technology for stable, efficient molecular photovoltaic (solar) cells.

Educational mission

Help KAUST become one of the world's greatest universities.

The Global Research Partnership

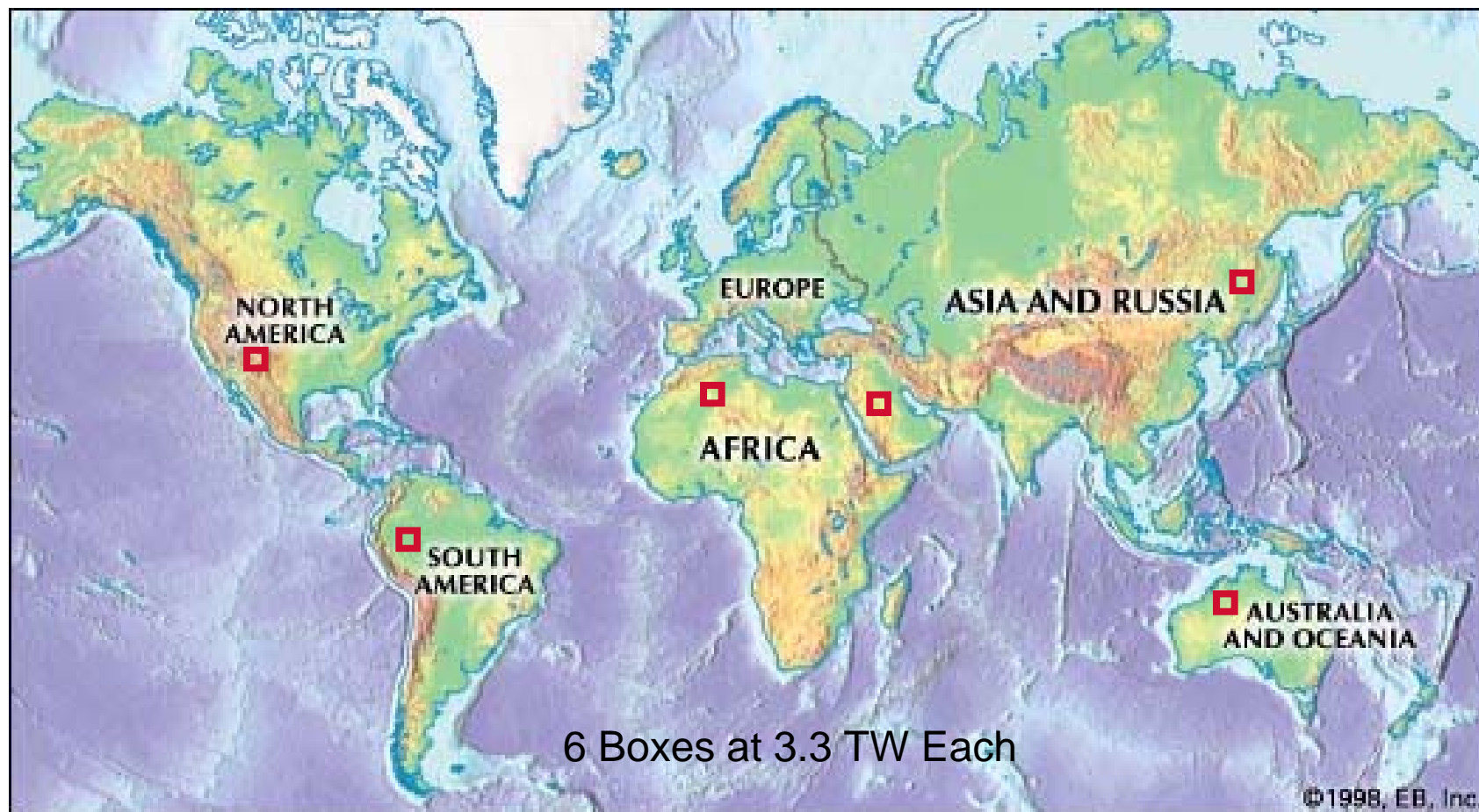




Energy enables advances in lifestyle

- The world's population uses 14 TW of power today
- It will need ~ 30 TW of power in 2050
- Much of the extra 16 TW must be provided without releasing CO₂ into the atmosphere

Covering less than 1% of the land with solar cells could meet our electricity needs



Saudi Arabia could provide electricity for much of Europe!

Roll-to-roll coating

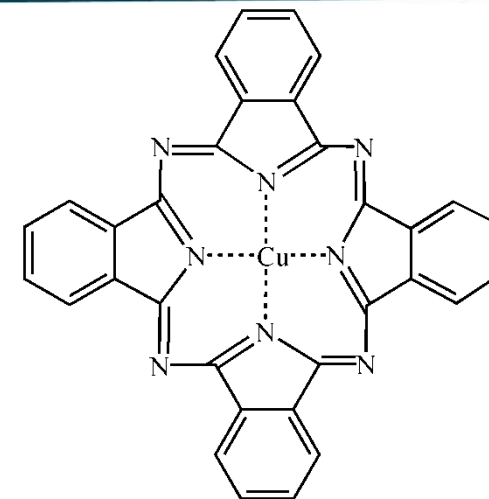


Molecular semiconductors



Attractive properties:

- Abundant: ~100,000 tons of CuPc manufactured each year
- Low materials cost: ~1\$/g → 17¢/m²
- Non-toxic



CuPc

Copper Phthalocyanine

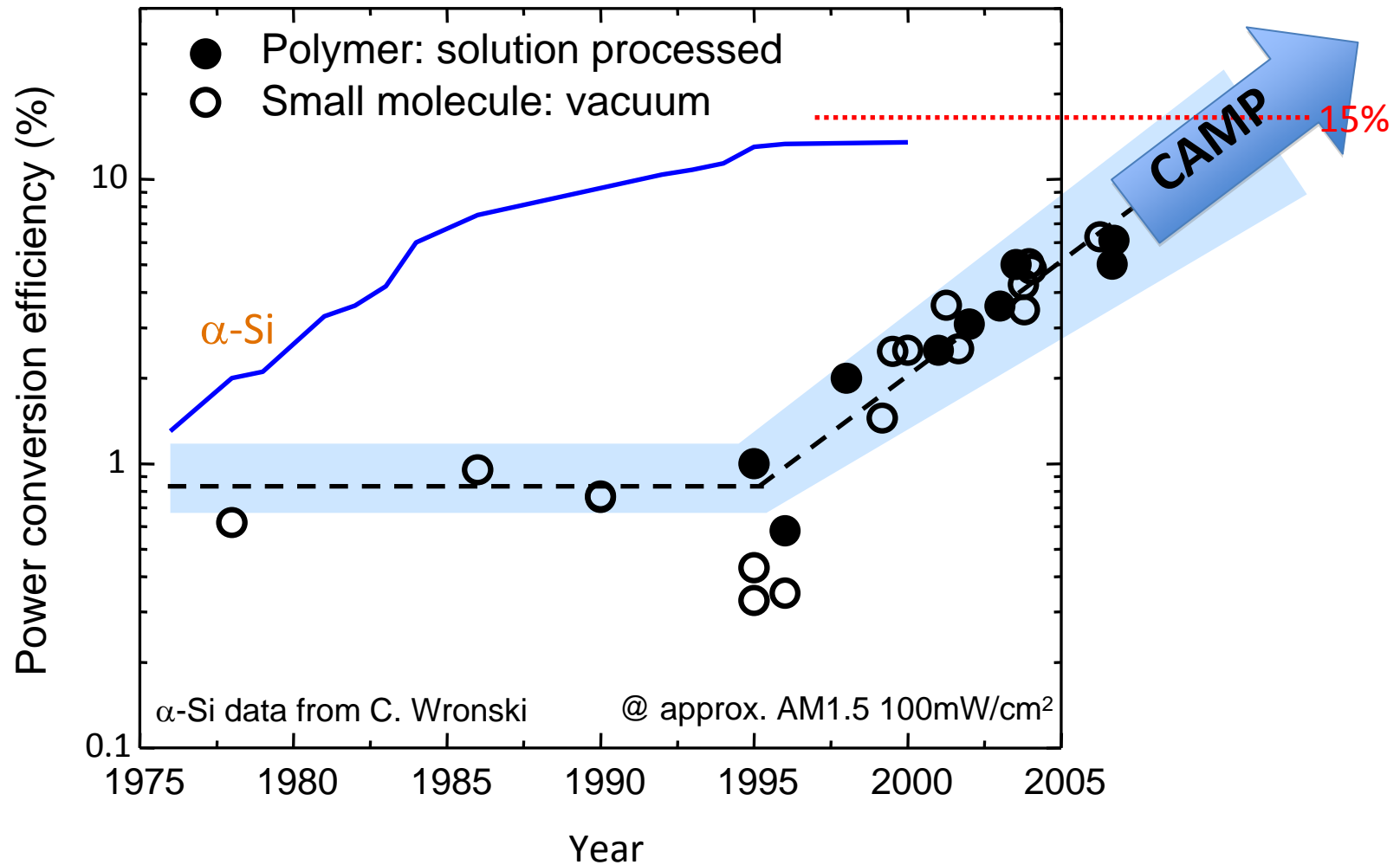


Ideal for Saudi Arabia

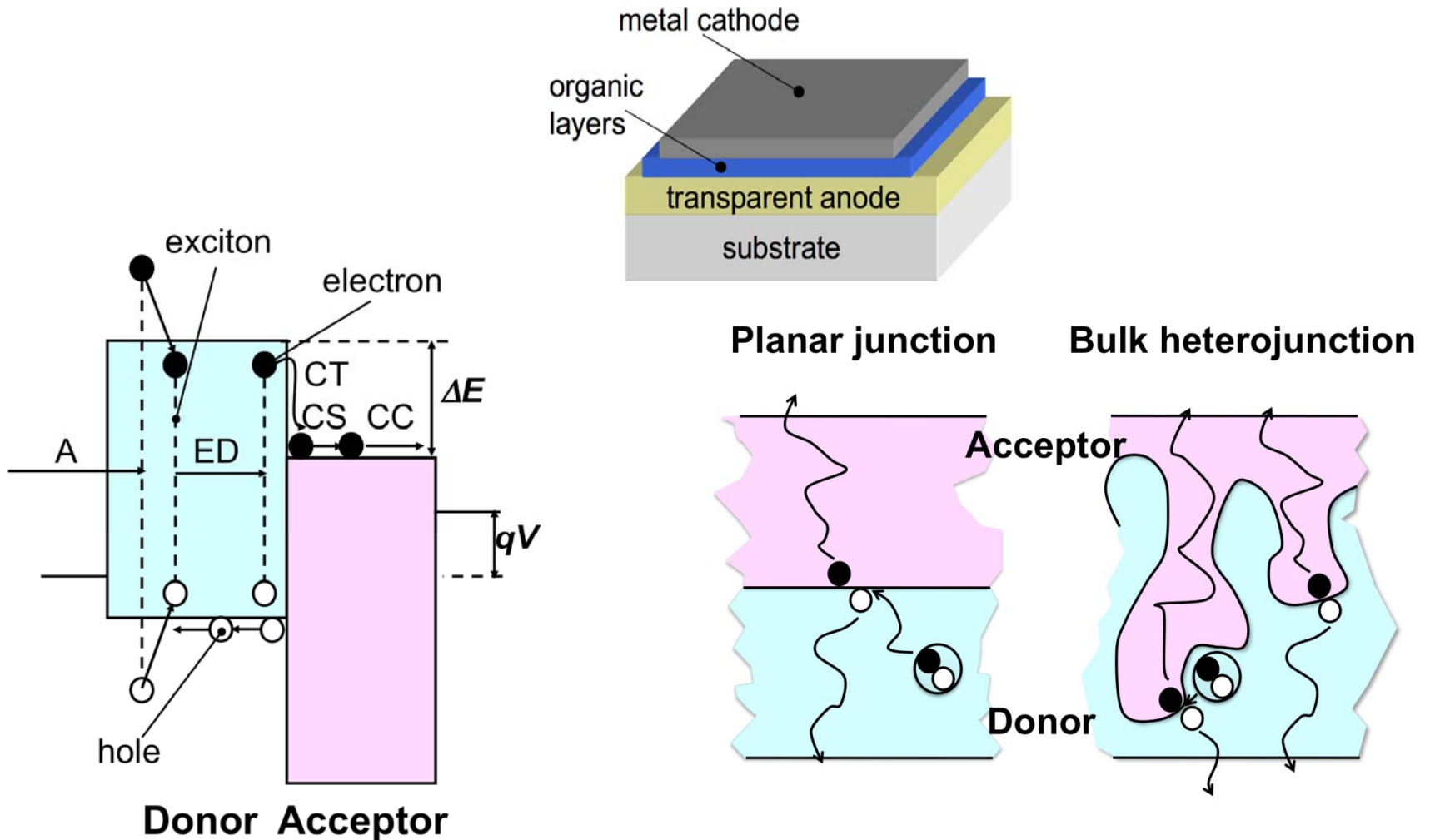


- Saudi Arabia has a sunny climate
- It is natural for Saudi Arabia to make solar cells from molecules
- Molecular PV is an active area of academic research that is ideal for KAUST

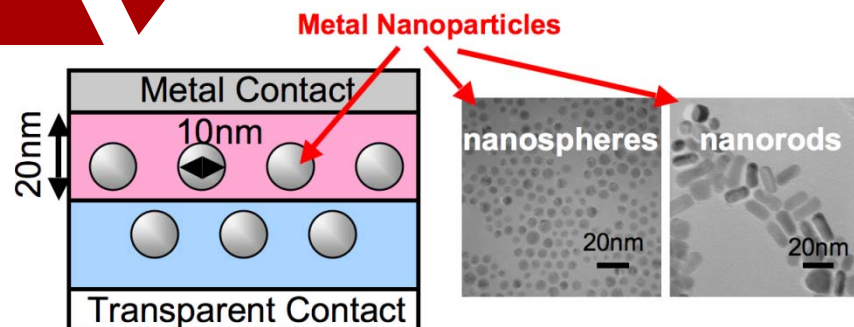
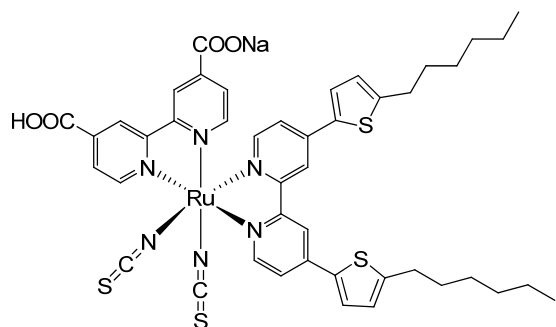
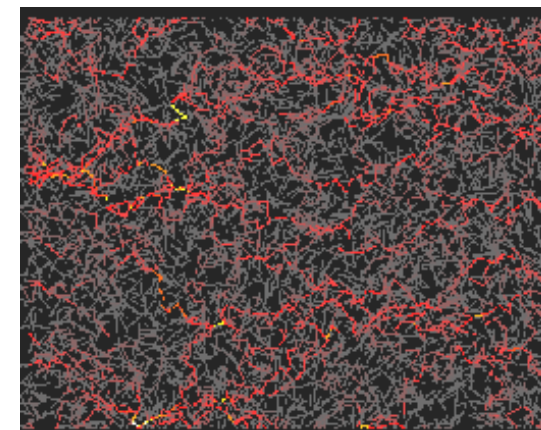
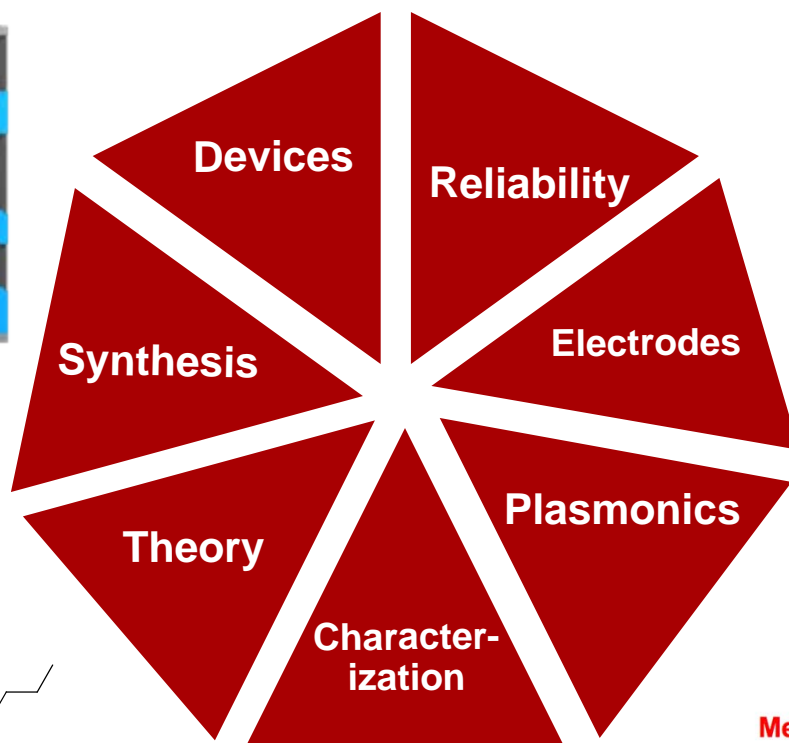
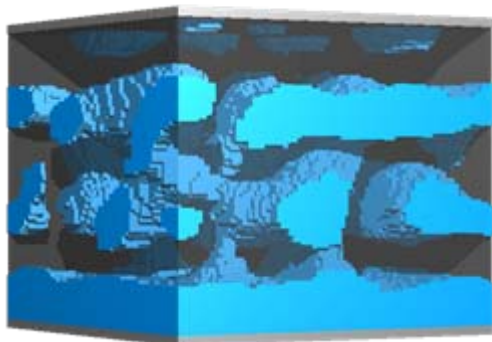
Record molecular PV efficiencies



Physics of molecular photovoltaic cells



Focus areas



Helping KAUST become a world-class university



- Use our substantial international network of colleagues to help the team at Imperial recruit faculty
- Train future KAUST faculty in CAMP labs
- Take sabbaticals in Saudi Arabia
- Help cover the teaching load, especially in 2009, and develop courses
- Send our students to KAUST to help build labs and act as teaching assistants
- Frequent week-long visits to KAUST to help develop curricula and labs
- Hosting KAUST visitors in our labs
- Introducing KAUST professors to the international scientific community at conferences

Building labs at KAUST



We will help KAUST build a world-class facility for organic electronics. This facility will put KAUST at the forefront of this field in terms of research and teaching.

Organic Electronics Lab

- Synthetic chemistry lab
- Glove boxes with spin coaters and evaporation chambers
- Electronics for measuring charge transport as a function of temperature
- Optics labs with assortment of lasers, lamps, detectors and monochromators for spectroscopic characterization

Nano Characterization Lab

- Electron microscopes
- Scanning probe microscopes
- Photoelectron spectroscopy
- Focused ion beam

Solar Cell Lifetime Measurements

- A unique capability for KAUST, excellent solar operating environment

Industrial Affiliates Program



- The affiliates will be invited to attend annual meetings
- Founding Members
 - Solvay
 - Konarka
 - Global Photonic Energy Corporation
 - G24 Innovations
 - Vitex
 - Unidyme
 - Southwall
 - Applied Materials

External Advisory Board



Alan Heeger (UCSB)

- Pioneering work that led to organic electronics
- Nobel prize winner

Stephen Forrest (University of Michigan)

- Vice president of research
- Seminal contributions to organic electronics

James Sheats (Nanosolar)

- Led organic light emitting diode team at HP
- Leads roll-to-roll coating team at Nanosolar

David Eaglesham (First Solar)

- Former president of MRS
- CTO of the world's most successful thin-film PV company

David Ginley (NREL)

- Leads the novel materials and molecular PV divisions at NREL

Ching Tang (University of Rochester)

- Father of the modern OLED and organic solar cell
- Experience in commercialization of organic electronics at Kodak

Come visit us at Stanford

