

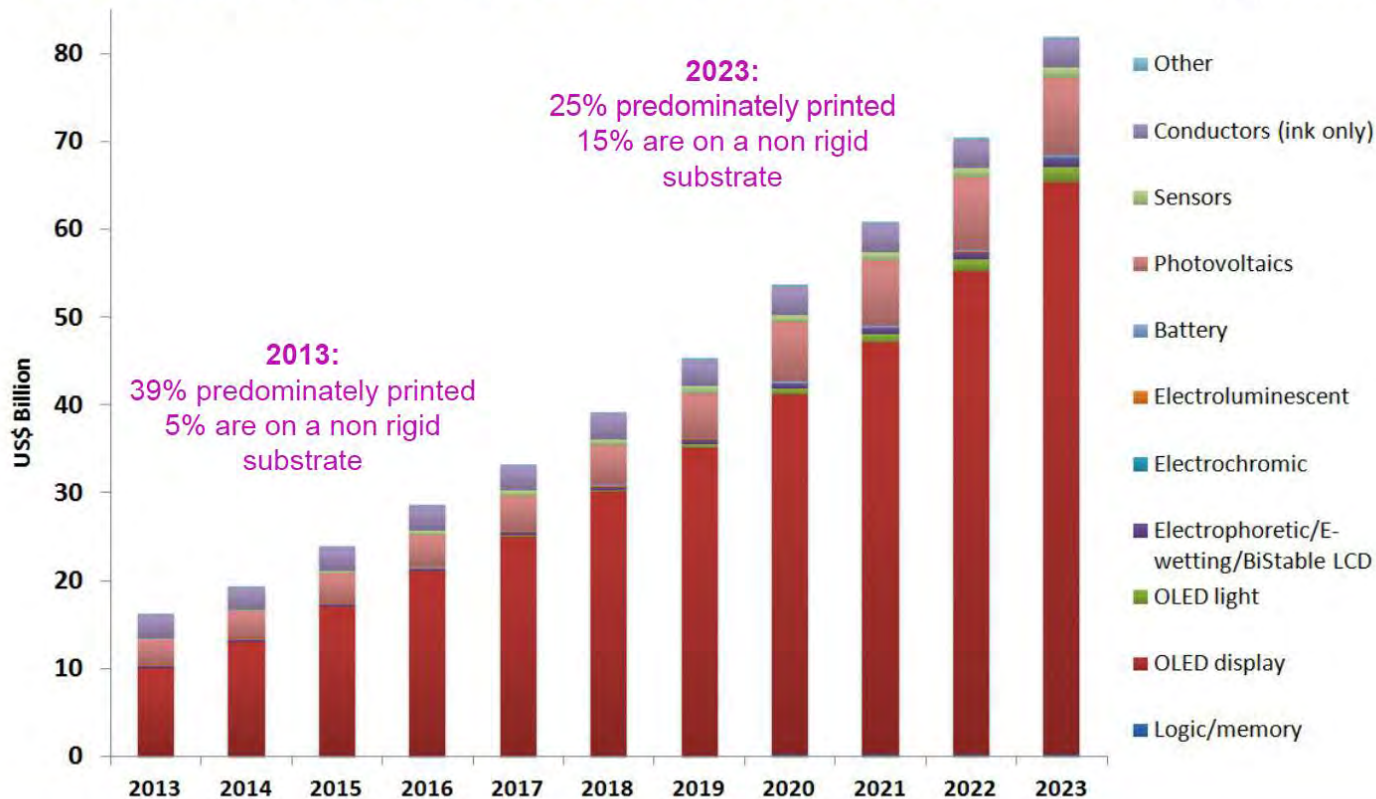
Flexible Hybrid Electronics @ COPE

Bernard Kippelen
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Market forecast

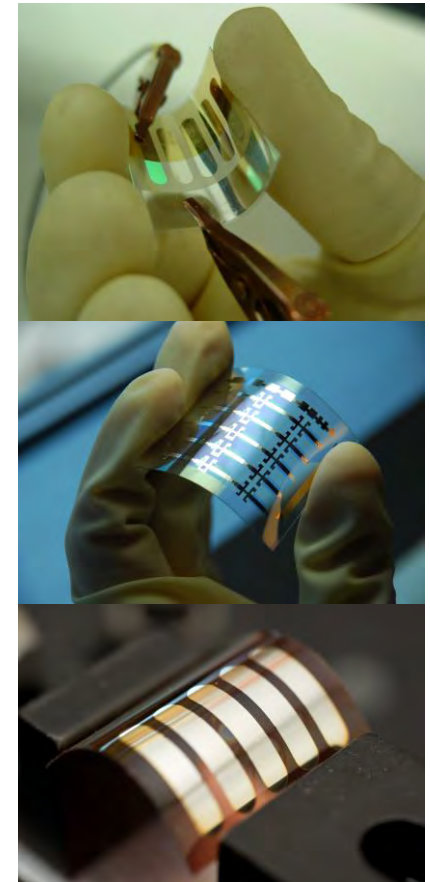
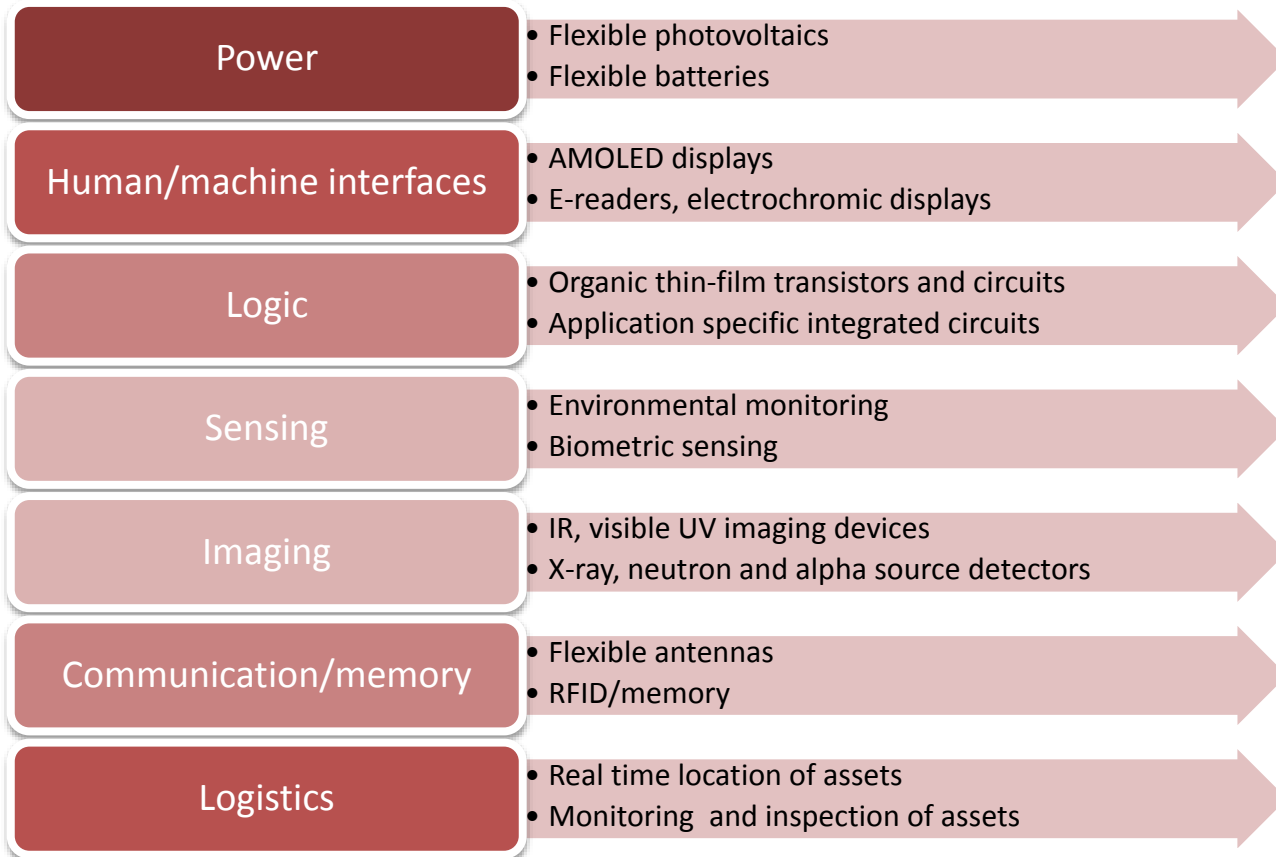
IDTechEx 2013-2023 Forecast

See www.IDTechEx.com/pe
for full details



Source: IDTechEx report "Printed, Organic & Flexible Electronics 2013-2023" www.IDTechEx.com

Flexible hybrid electronics

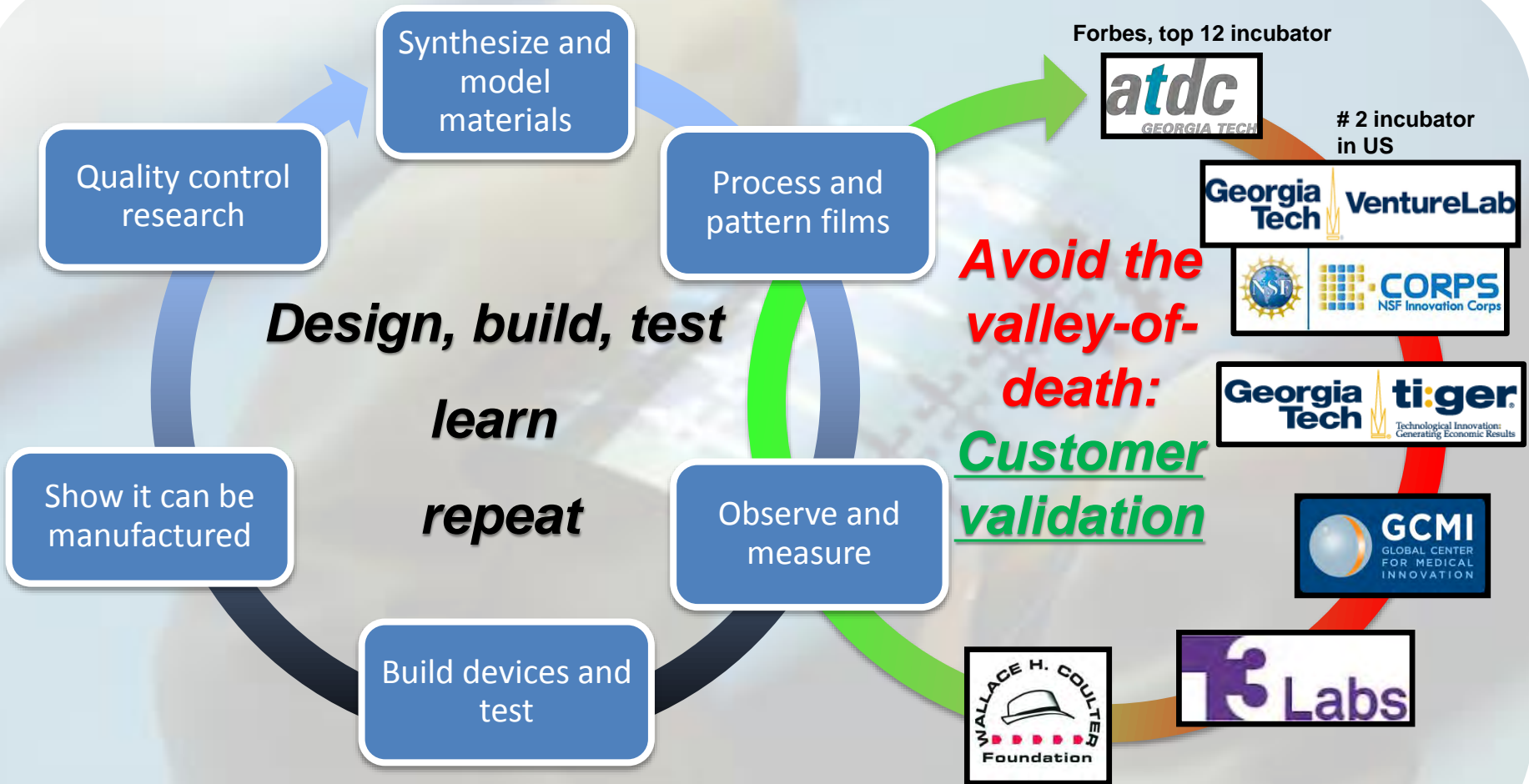


Center for Organic Photonics and Electronics (COPE)

- ❑ Established in **2003** at GA Tech.
- ❑ Multidisciplinary approach to research, training, and innovation (raised > \$80 M since 2003).
- ❑ 36 faculty from 7 different schools.
- ❑ Shared facilities in computing, synthesis, material characterization and device fabrication.
- ❑ An innovation partner for industry.

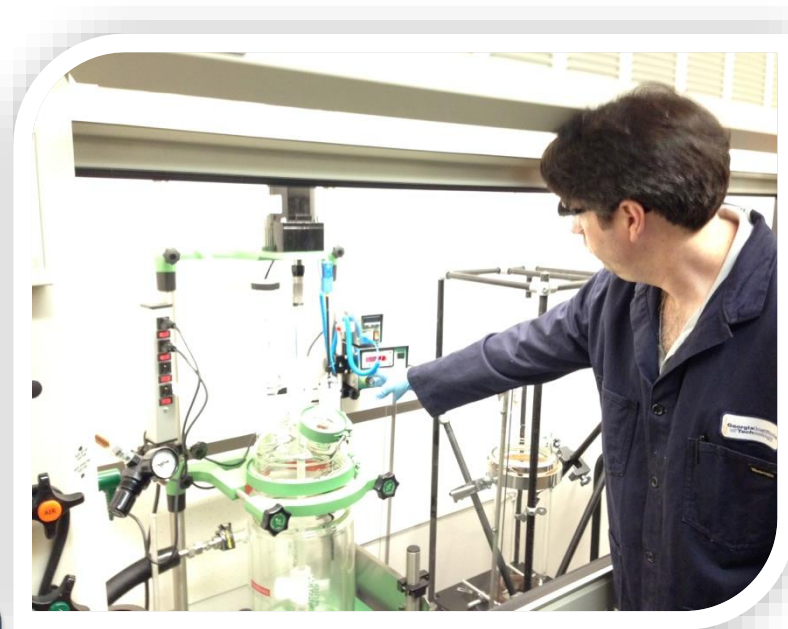
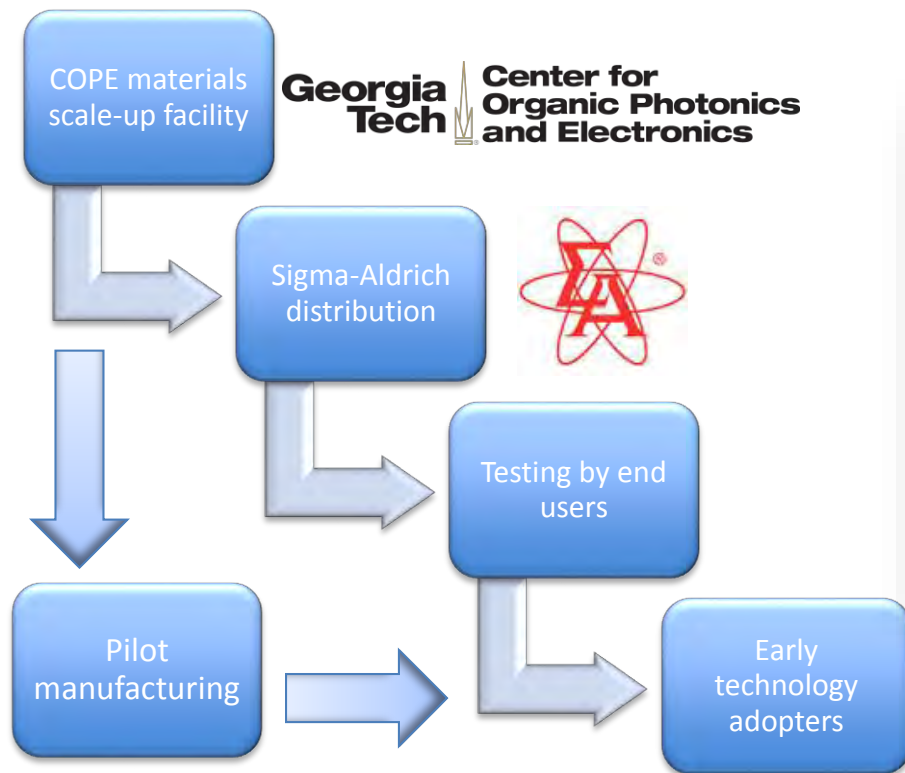


Integrated science and engineering cycle in an ecosystem for innovation



Key enabling infrastructure: materials scale-up facility

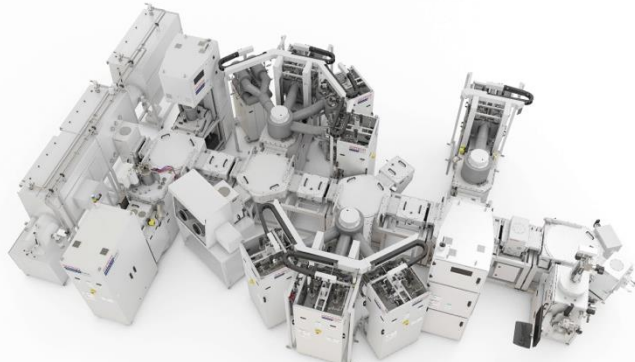
A culture of innovation stresses partnerships: the COPE/Sigma-Aldrich partnership



COPE scale-up facility

Georgia Tech's technology infrastructure

Semiconductor material growth and pilot manufacturing



OVPD laboratory



MOCVD laboratory

e-beam, photolithography, ICP and RIE etching, PECVD, ALD, metal coating



ALD

Institut Lafayette, France

INSTITUT LAFAYETTE



Building inaugurated in May 2014



> 30 M€ investments, building of 25,000 sq. ft., including 5,000 sq. ft. lab space and fully equipped 5,000 sq. ft. clean room (> 10 M€ investment in equipment)

OVPD Pilot Manufacturing



Delivered on Feb. 24, 2015,
Commissioning in progress

Organic Vapor Phase
Deposition (OVPD)
cluster tool.



200 mm 8 organic
source cluster tool with
metallization chamber.

Research on light harvesting devices for portable power; interface science



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A "universal" plastic coating could lead to lower cost, more flexible electronic devices.

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Scientists Create Recyclable Solar Cells From Trees

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Last year in April 2012, researchers at the [Georgia Institute of Technology](#) created the first plastic solar cell ([Forbes: New Technique Creates First Plastic Solar Cell](#)) which they hope will help change requirements for manufacturing of organic printed electronics. That plastic solar cell was created through a special program at [Georgia Tech](#) called the Center for Organic Photonics and Electronics (COPE), which studies the use and development of printed electronics.

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New Technique Creates First Plastic Solar Cell

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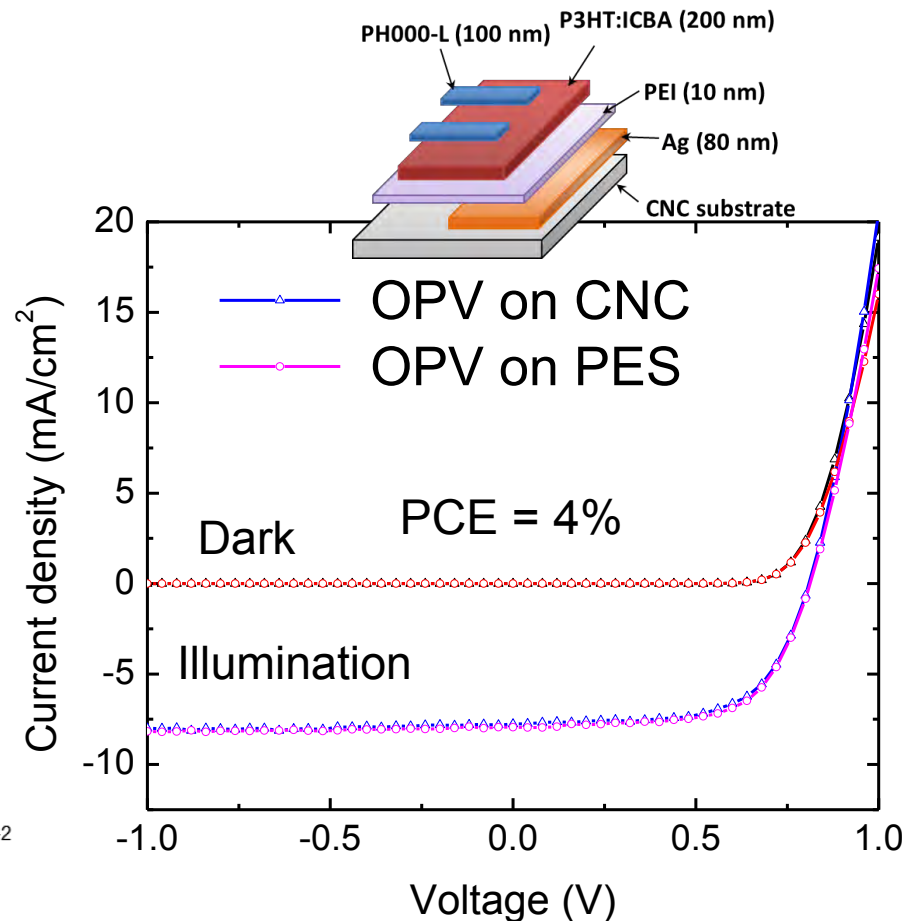
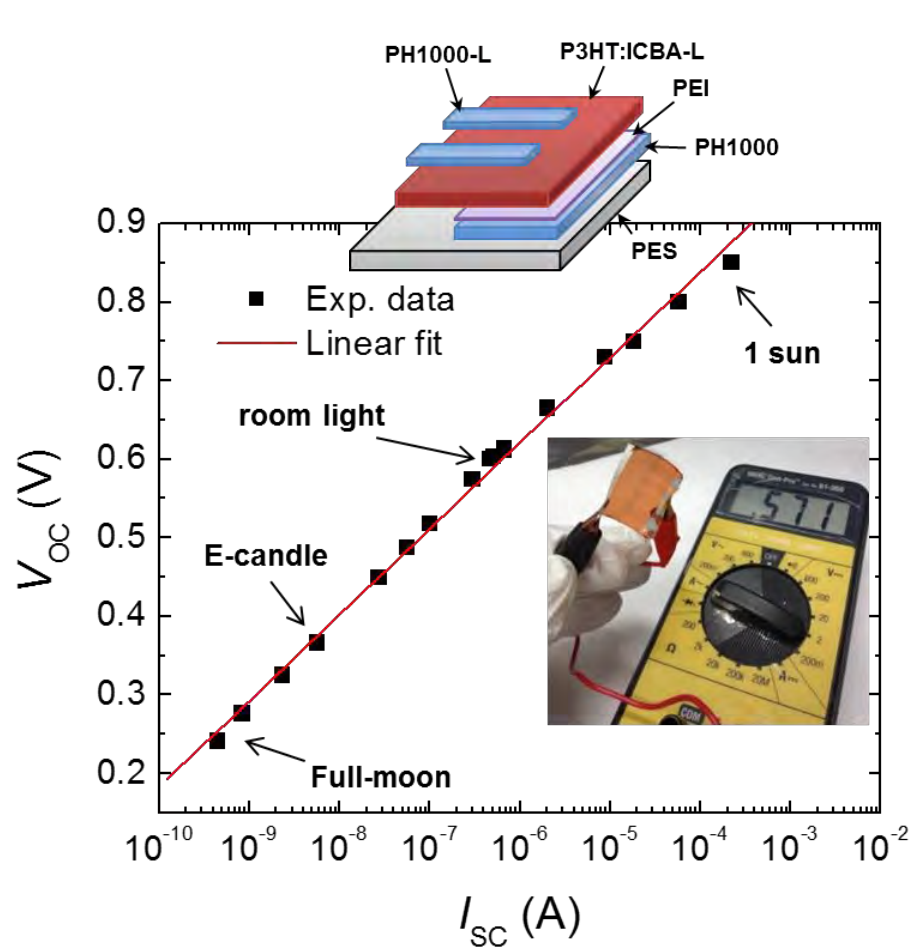
The growth of the solar industry has been limited by the supply of the polysilicon material used to make solar panels. In 2006, more than half of the world's supply of polysilicon was used for production of renewable electricity. In 2008, only twelve factories produced solar-grade polysilicon. In 2011, the industry produced an excess of polysilicon. And now, another shift — the creation of a plastic solar cell.

Georgia Tech's Bernard Kippelen and his team developed the first completely plastic solar cell. Courtesy: Virginie Drujon-Kippelen

Researchers at Georgia Tech's [Center for Organic Photonics and Electronics](#), (COPE) have discovered a new technique to reduce the work function of a conductor and by doing so, created the worlds' first plastic solar cell. And, the creation of that plastic solar cell could change the requirements for the manufacturing of organic printed electronics.

EFRC
CIS:SEM

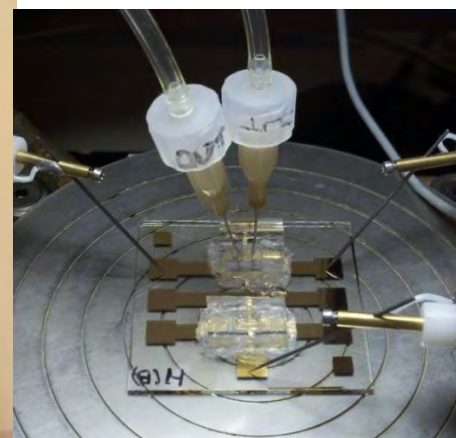
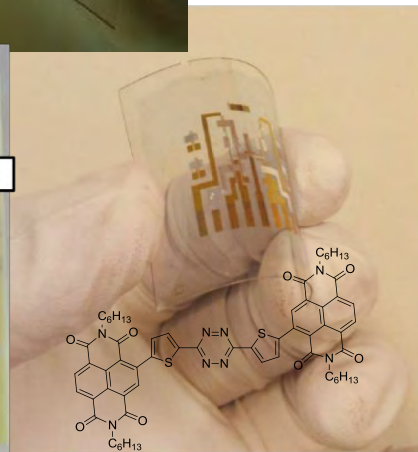
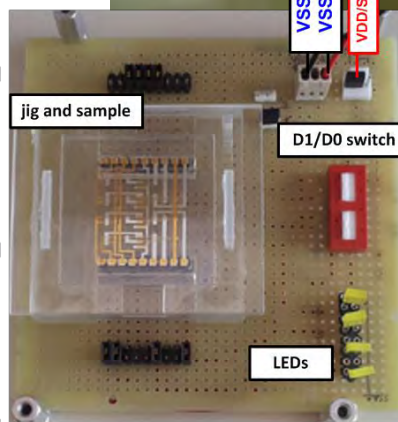
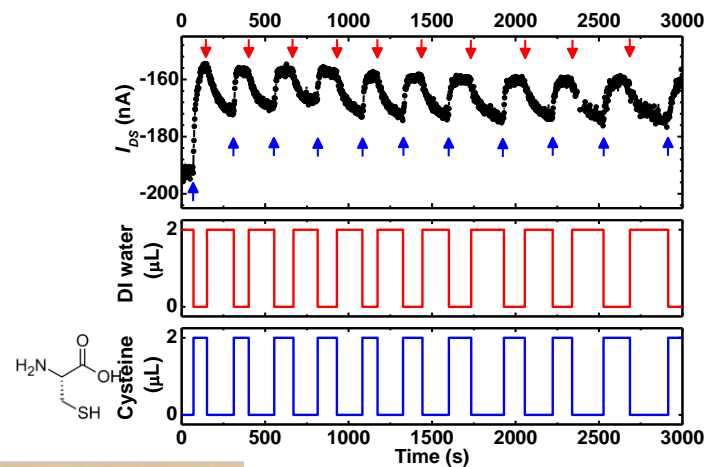
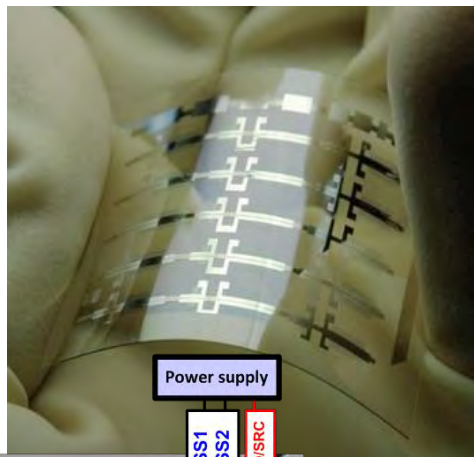
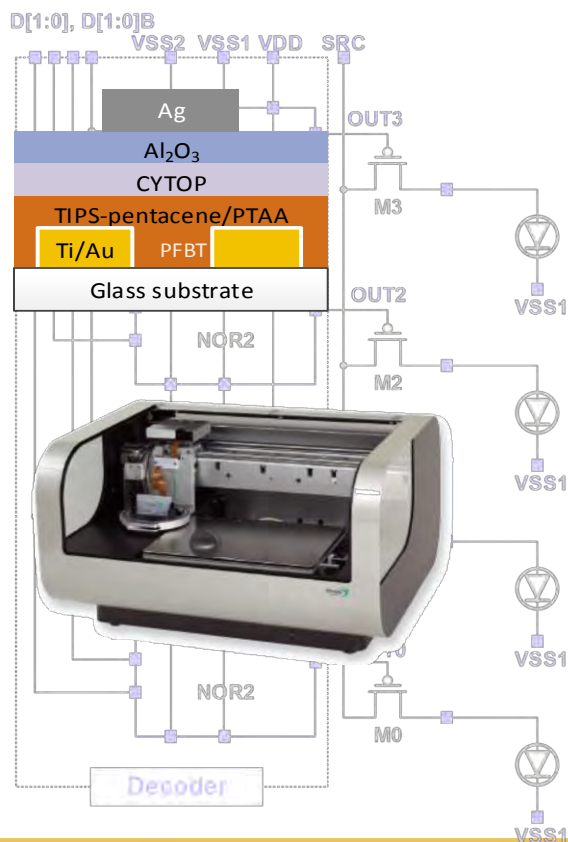
Portable power in recyclable substrates



CNC: cellulose nanocrystals

COPE sensor platforms

Proprietary air-stable scalable organic field-effect transistor technology for non-destructive sensing

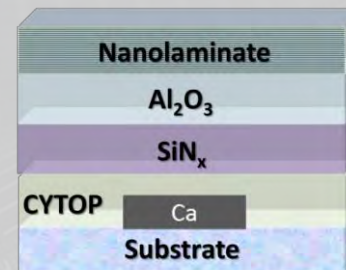
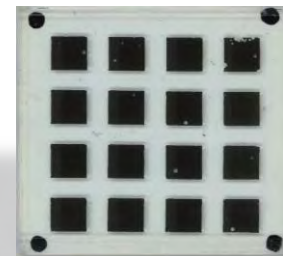
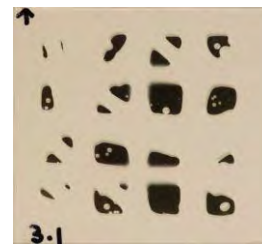


Key enabling technologies: ultrabarrriers

COPE ultrabARRIER coating technology for flexible hybrid electronics based on Atomic Layer Deposition



Calcium sensors



> 500 h @ 85° C and 85% RH

General Information

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