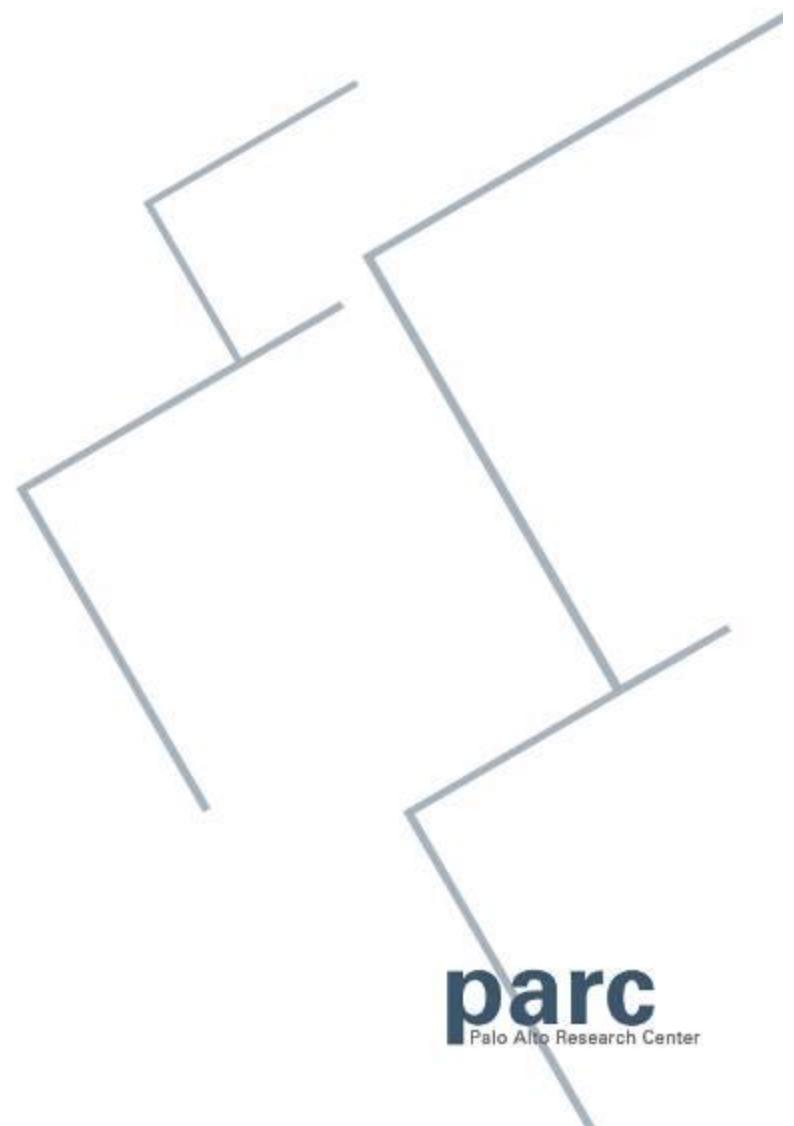


Flexible electronics

Bob Street

Senior Research Fellow
Palo Alto Research Center

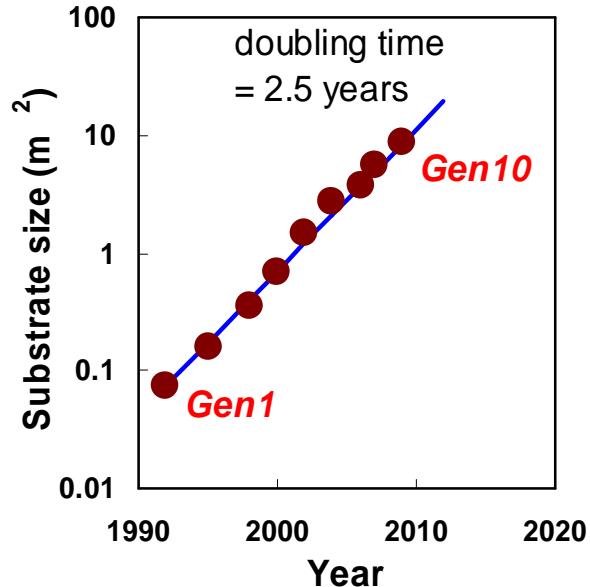


parc
Palo Alto Research Center

Future displays

Current displays

- Conventional processing on glass substrate
- Cost reduction by scaling to large size
- \$100B business

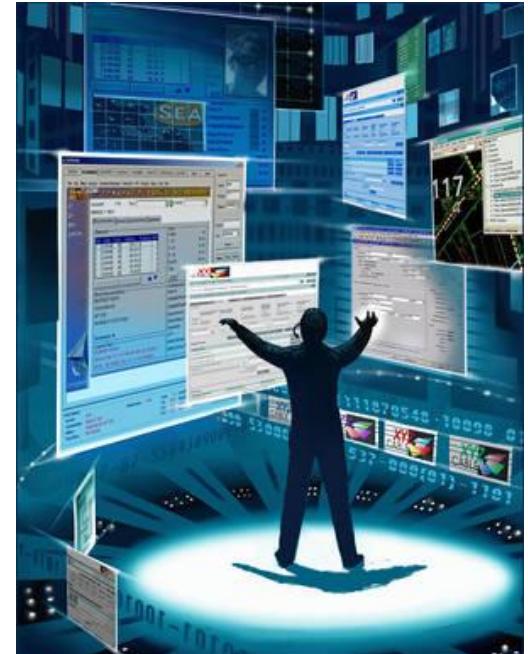


Key challenges

- Changing the manufacturing/cost paradigm
 - Lithography → digital printing
 - Batch processing → roll-to-roll
 - Glass → flexible substrates
 - Vacuum → solution deposition in ambient
 - High performance materials
 - Green technology

Attributes of future displays

- Multifunction, Embedded, Flexible, Portable



<http://www.donnarosenartists.com>

Why flexible electronics?

- Rugged, light weight, roll-up
 - E-paper, portable displays,
 - Solar cells
 - RFID tags, smart cards, etc
 - Unbreakable x-ray imagers
 - Security systems
- Roll-to-roll manufacture
 - Low cost electronics
- Conformal and stretchable
 - medical diagnostic sensors and therapeutic patches
 - Retinal camera
 - Shaped devices



Polymer vision
Radius



Plastic Logic Reader
parc
Palo Alto Research Center

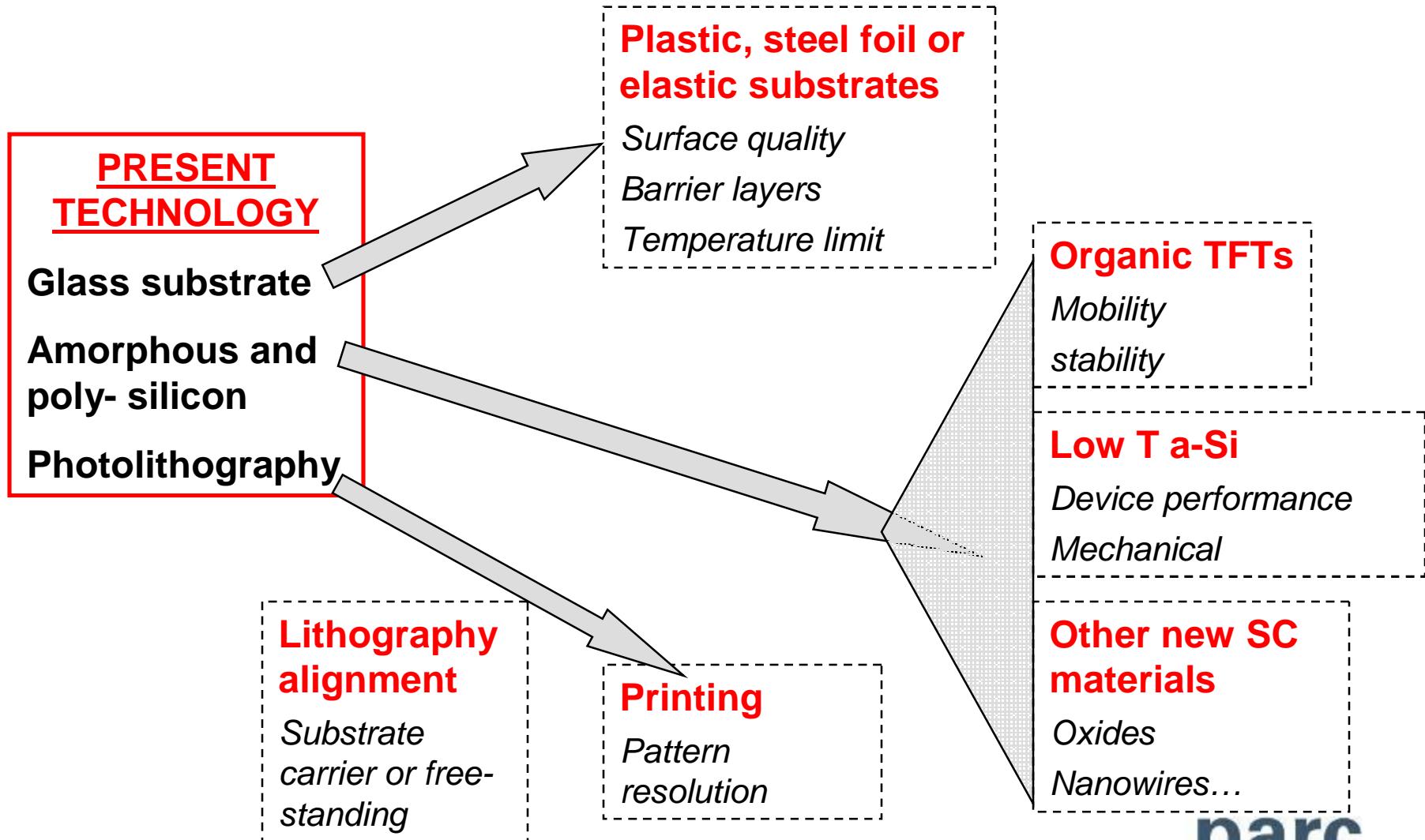


PolyIC RFID tag

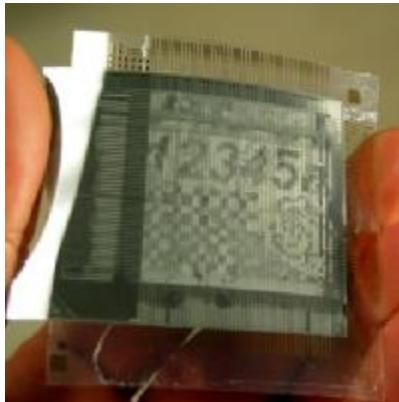


Research challenge

Many materials issues



Some examples of flexible electronics at PARC



Paper-like displays



Jet-printed polymer transistors on plastic

Display media: E-ink electrophoretic imaging film

a-Si TFTs on PEN

p-Si organic light emitting diode display on steel foil

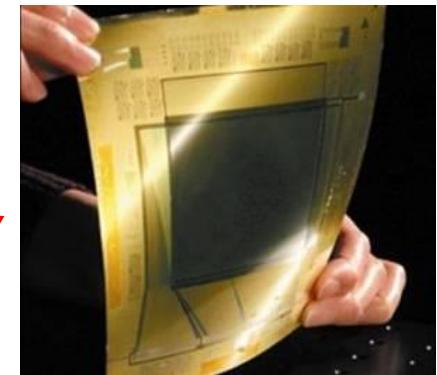
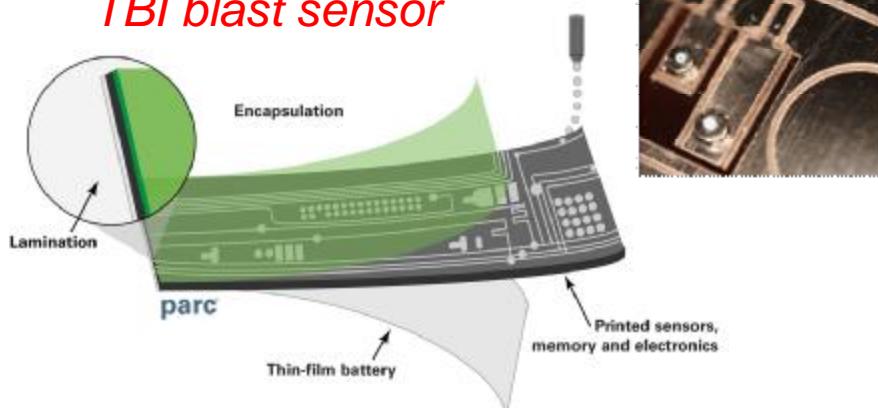


Image sensors

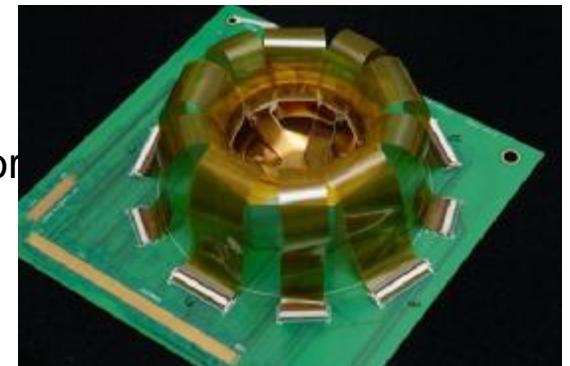


Polymer image sensor on plastic

Flexible printed sensors; TBI blast sensor



Curved a-Si image sensor on plastic



What needs to be done

- Be (stay) ahead in materials research
- Assist the transition from research to manufacturing
- Compete with Asia and Europe
 - Asia display manufacturing draws in new technology
 - Europe gives strong support to solar and printed flexible electronics

New technology;
Universities, start-ups etc

Materials suppliers;
Corning, 3M, Merck

Equipment manufacturers;
Applied materials, etc

Display manufacturers;
Samsung, Sharp, AUO,
Philips