Organic electronics for smart integrated platforms

What kinds of Circuit Design Approaches Make Sense?

Digital Integrated Circuits:

- Silicon process approaches are mature, competitive, and optimized
- Little opportunity for impact

Complementary Designs:

- ZERO Standby Power
- P, N Materials Available
- Outside Industry R&D Focus
- Example: "Brighter" LED Drivers

Cross-Process Circuits:

- Input, Output Stages have different fabrication processes
- Resulting cost in entrenched Silicon processes is high
- Example: MEMs Driver
  - 0-5V Input; 50-100V Output
  - 10-50X cost reduction.

Short Lifecycle Products:

- Small volume or interim solutions
- Bridge market entry opportunity
- Examples
  - Research prototypes
  - Applications awaiting a process

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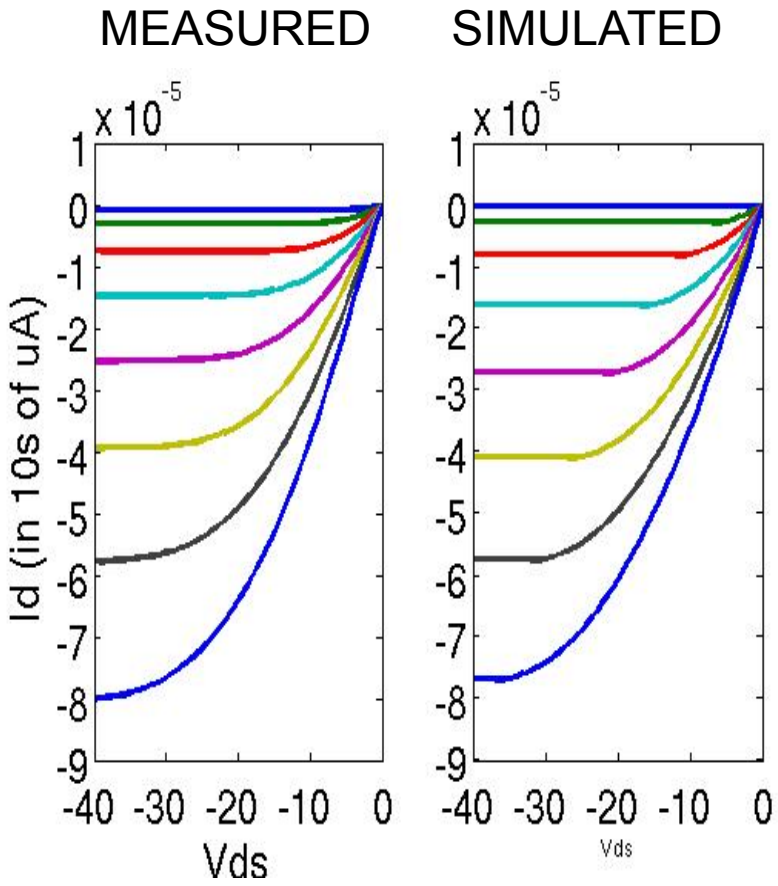
The importance of Modeling



Models based on Empirical Data:

- **Complex Circuit Simulation using Industry standard SPICE**
- **Benchmarks against industry standard silicon processes**

Models based on Theory:

- **Ensure model integrity**
- **Enable higher order analysis**
- **Establish limits of performance**
- **Require broad access to fundamentals**

First generation of models are traditionally generated in academics and form a Vital platform for expansion of the technology.

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Unique Contributions to High Profile Systems

Integrated System: Active Matrix Organic LED Drivers

- Standard circuits: Not competitive
- High-risk Circuits: STC is competitive

Critical for Large Area Displays?

P-type + N-type =

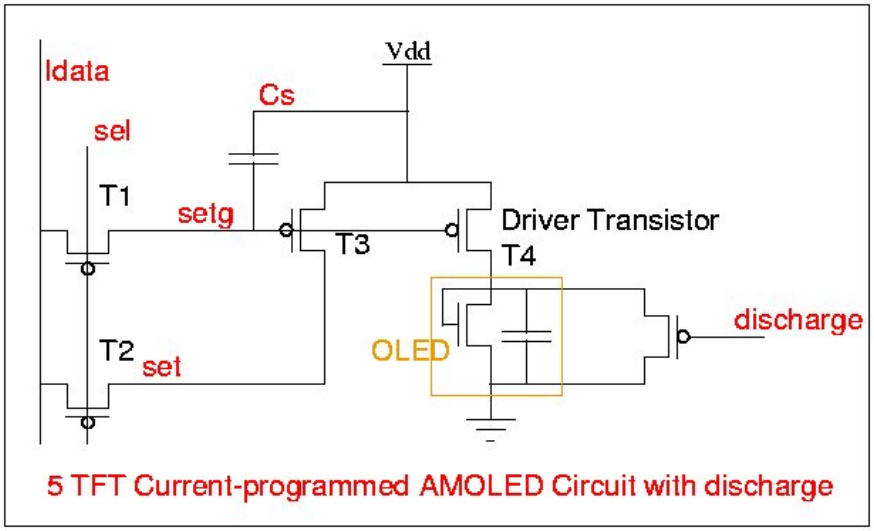
Low Power

Higher Resolution

Faster Speed

Higher Currents

Single pixel (shown): zero standby power



5 TFT Current-programmed AMOLED Circuit with discharge

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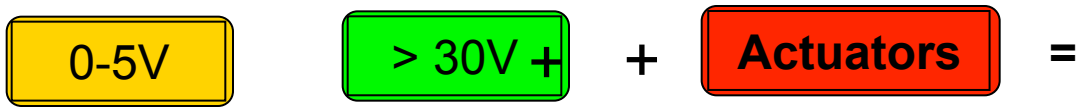
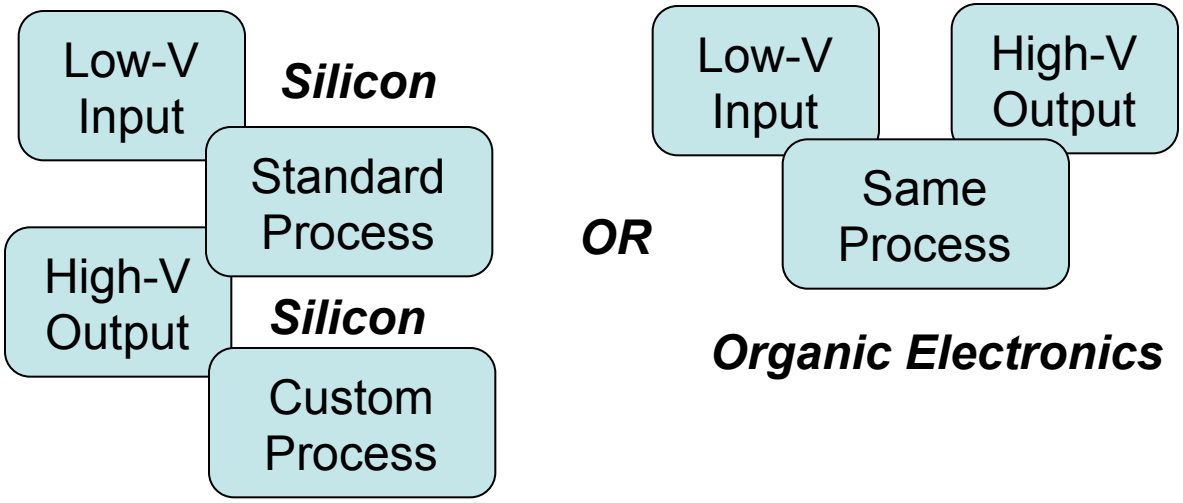
Unique Contributions to Low/Moderate Volume Markets

Integrated System: MEMs (actuator) Drivers

- Existing Technology: Cross-Process Silicon
- Contribution: 1-50X reduction in cost





Enhanced Access to MEMs?

Changing Possibilities

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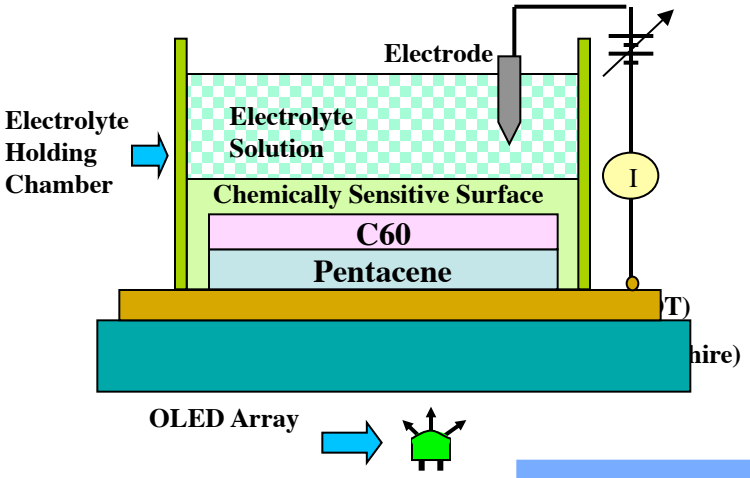
Facilitating Technology: (for) Chemical and Bioloigical Sensors

- Electrochemical Sensors: Light-Addressable Potentiometric Sensor



Light

plus

Amplification Electronics

=

Necessary for high spatial resolution (micron scale) sensing

Facilitating Technology: (Improved Lifetime) Feedeback in AMOLED Arrays using SPR