CMDITR 101: Project 3.1

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http://www.stc-mditr.org

Key Vocabulary Words

OFET

A. Oblong Fearlessly Efficient Transistor
B. Organic Field Effect Transistor
C. A device where the current-carrying channel is an organic material

Complementary

A. Wow! You are one beautiful transistor!
B. When one is off, the other is on (transistors, that is).

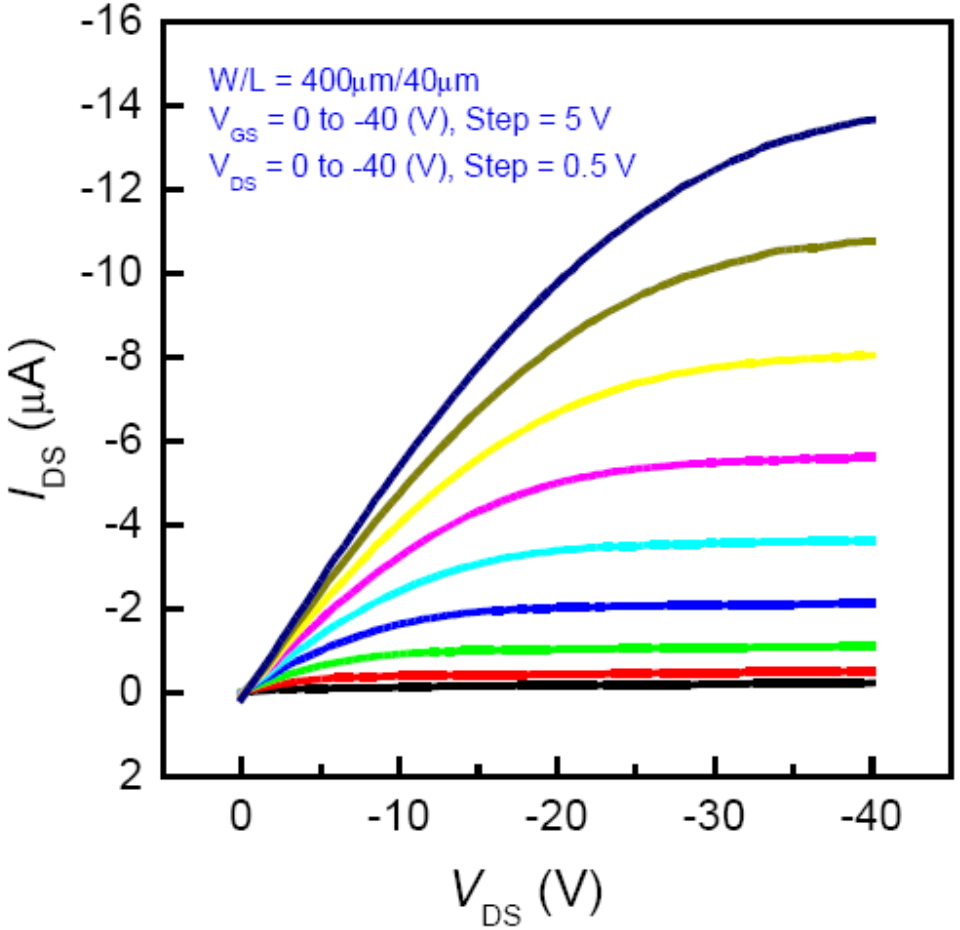
Ambipolar

A. Uncertainty regarding manic state or mood
B. A device where the same transistor can change from p-type to n-type depending on the range of applied voltage (cool …)

Mobility – key constant of proportionality between current and voltage in an OFET (represents the speed of current carriers in the transistor channel)

Pursuing the Benchmark

Competitive with Amorphous Silicon



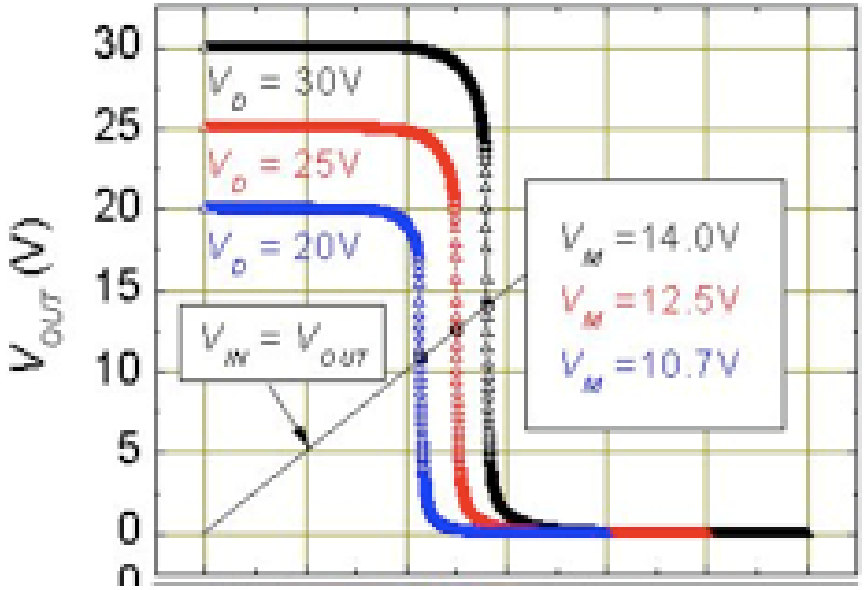
Achieve Comparable Mobility to Amorphous Silicon (1-10 cm^2/V-sec)

By 2010, MDITR has demonstrated:
C60 (N-type): 2.5
Pentacene:
Specialized Dielectric: 4.0
Standard Dielectric: 0.39-0.9

Chasing the Digital World

Complementary & Ambipolar Devices

The Digital World is driven by SPEED and its consequential cousins, power & power supply



Complementary Transistors:

- Enable ONLY ON and ONLY OFF states (no standby current = lower power dissipation)
- Enable an output voltage to swing from as high as it can go to as low as it can go (smaller power dissipation)
- High Gain (Output/Input) = faster speed

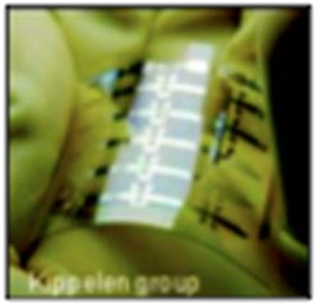
Ambipolar Transistors

- Enable one input to switch a single transistor between itself and its complement
- At sufficiently low powers, these transistors offer SMALL & CHEAP

Societal Impacts of Project 3.1

- Lower energy consumption for TV & Displays
- Lower environmental impact
  - Smaller, thinner, lighter (less material waste)
  - Reduced GHG emissions (possible)
  - Reduced environmental health impact
  - Shorter half life (degradation)
- Enhanced Portability through Flexible Electronics
- Expanded Application Base
  - Smart Clothing
  - Form-fitting applications
- Advances in Manufacturing
  - Faster Prototyping (ink-jet style)
  - Roll-to-Roll in Mass Production

Transistor Yoga: Flexible Electronics



Enable Electronics to be placed in applications impossible with rigid Silicon