Tehnologije organskih poluprovodnikih materijala i komponenti
ORGANSKA ELEKTRONIKA

Šat je organska elektronika

Organska elektronika za razliku od klasične koristi plastične mase (polimere) sa različitim provodnim karakteristikama

Prednosti i mane

Dok obrada silicijuma traži temperature iznad 1000^0C i potpuno čist prostor organska elektronika traži samo sobnu temperaturu.

Postupak izrade nije štetan za okolinu i štedljiv je u pogledu materijala.

Organska elektronika omogućava jeftinu masovnu proizvodnju.

Osnovni materijal se u tankom sloju nanosi na noseće materijale, lako se prilagođava površini i praktično je nesalomiv.

Moguće ga je nanositi inkjet štampačem sa elektronskim mastilom ili klasičnim postupkom štampe.

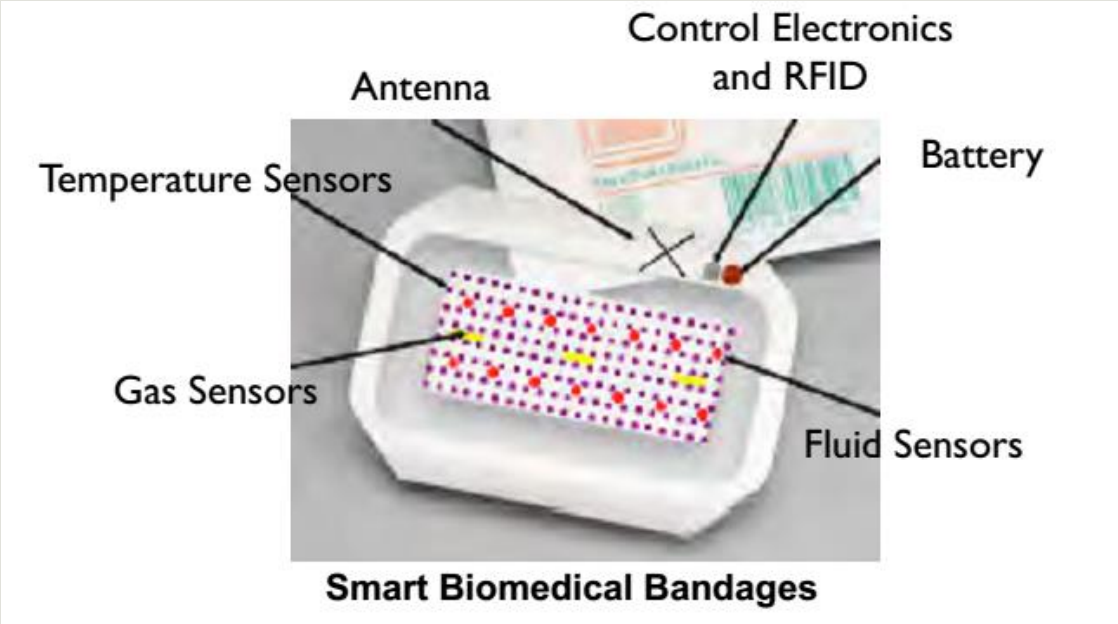
Štampanjem je moguće izraditi tranzistore, LED diode, solarne ćelije, baterije…

Slabost je slaba električna provodnost.

Fleksibilni displeji

Fleksibilnos omogućava novi koncept u elektronici

Smart (pametni) zavoj u biomedicini



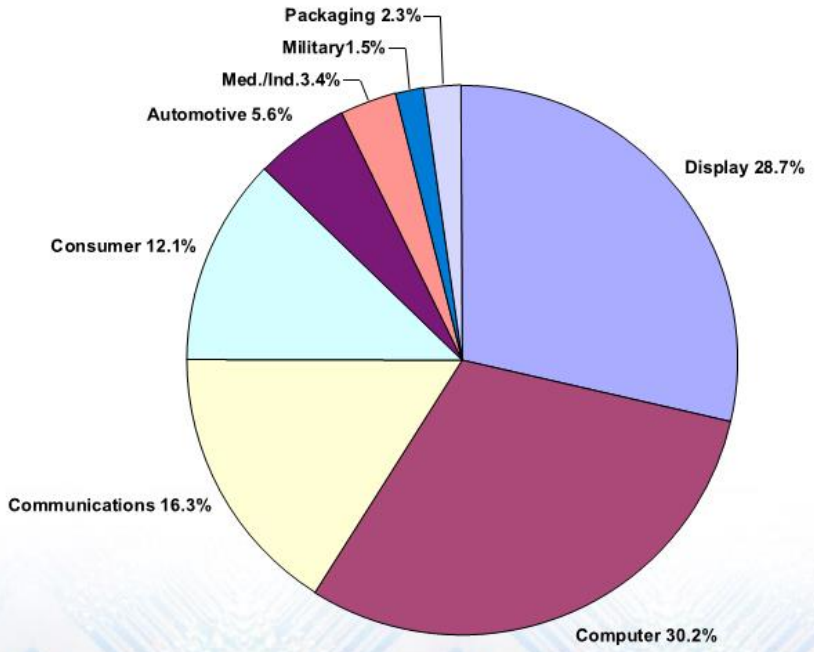
Jednostavni procesi omogućavaju nisku cenu

Šat je organska fleksibilna elektronika

Fleksibilna elektronika - mogu se savijati, naprezati, rolati u radijus od nekoliko centimetara bez gubitka funkcionalnosti.

- Tanki profili
- Velike površine
- Fleksibilan
- Pogodan za nošenje
- Može se napraviti u obliku rolne.

2009 GLOBAL FLEX CIRCUIT MARKET



TOTAL: $9.1Bn

Tehnologije koje omogućavaju fleksibilnu tehnologiju

- Tehnologije tankoslojnih tranzistora
- Aktivne matrice
- Provodni slojevi
- Plastični, stakleni i metalni substrati
- Nove metode depozicije

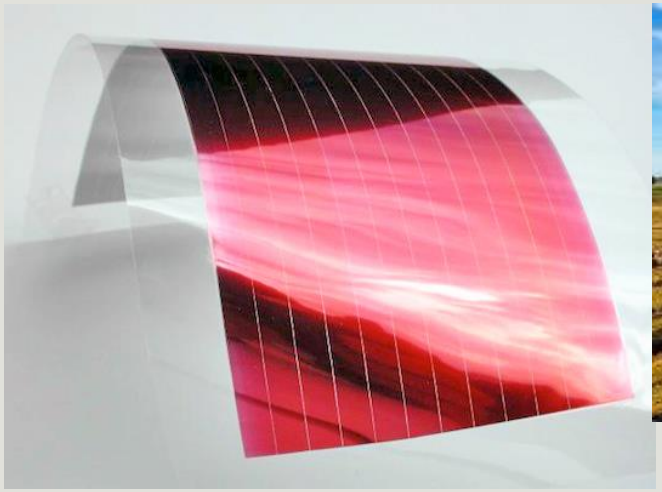
Zašto je ova tema interesantna

- Ako je cena dovoljno niska može se primeniti na svakodnevne predmete (dati im elektronska svojstva)

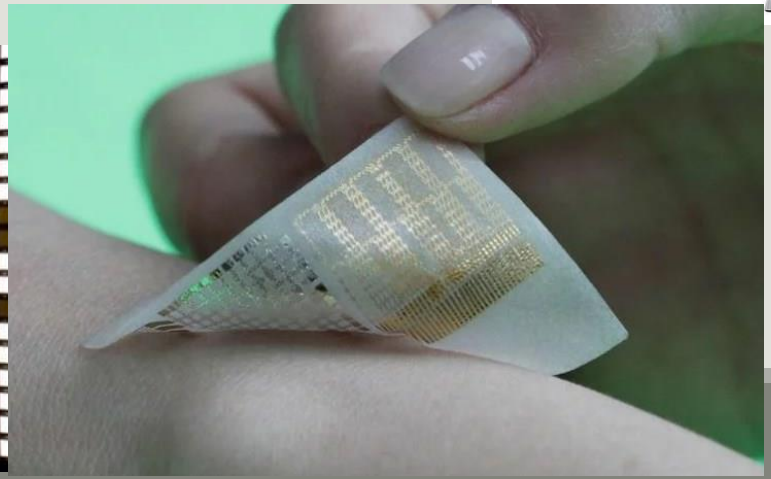
- Displeji za prikazivanje slika mogu se urolati da stanu u džep
- Zamislite solarne panele u odeći ili da je odeća neki senzor
- Zamislite svetlosni izvor koji visi sa zida kao slika

PRIMERI

- Fleksibilni ekrani
- Ravni paneli za osvetljenje
- Organske solarne ćelije
- RFID
- Pametni zavoji

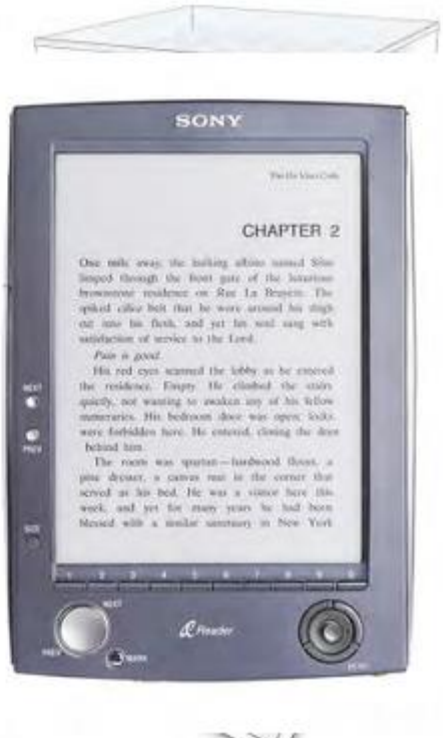


SAMSUNG
QLED
GAMING
MONITOR



Elektonika je svuda

Pioneer

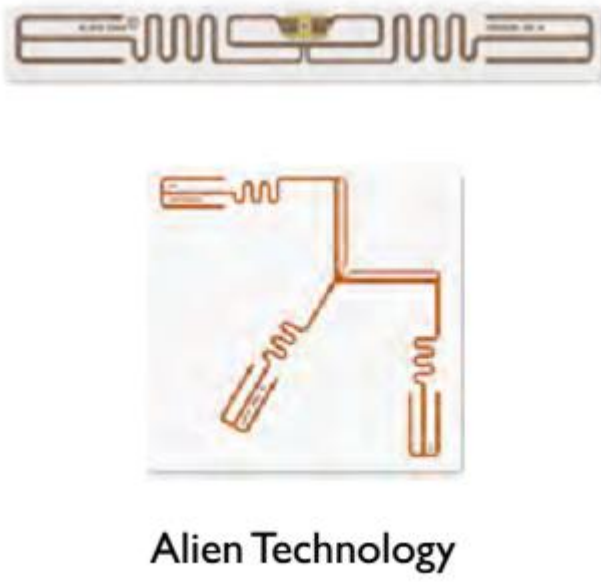


Sony eReader
e-Ink & Lucent

Electrolux

RFID (Radio frequency identification)- Identifikacija putem radio frekvence

- RFID je sistem daljinskog slanja i prijema podataka.
- RFID pločica je izuzetno malih dimenzija i može se zalepiti ili ugraditi u željeni proizvod.
- RFID pločice sadrže antenu koja omogućava prijem i slanje radio-talasa od RFID primopredajnika.
- Zamislite kutiju mleka sa RFID etiketom
- Frižider koji Vam kaže kada je zastareo ili potrošen
- Da će se koristiti za praćenje popisa većine maloprodajnih stvari
- Kada će se završiti



Organic light emitting diodes (OLEDs)

Pioneer
(1997)

Pioneer
(2001 - demo)

Kodak
(2004)

Motorola
(2001)

Sony
(2004)

OLEDs vs. Liquid Crystals

Kodak Professional

TAKE PICTURES. FURTHER.™

OLEDs for lighting

GE

Organic thin film transistors (OTFTs)

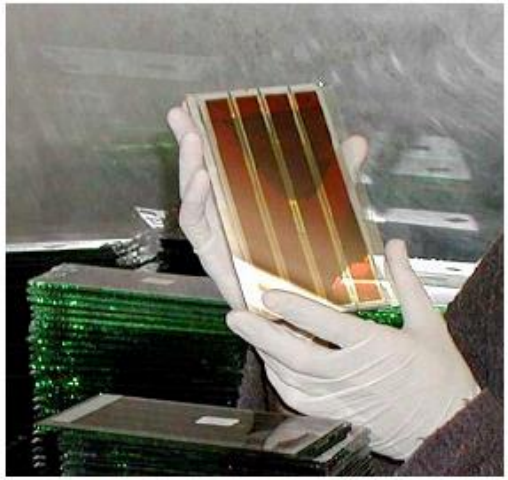
Electrolux

All-polymer integrated circuits (Philips, 1998).

OPVs Solar Cells for energy production

Solaronix

Sustainable Technologies International



Organic Substrates

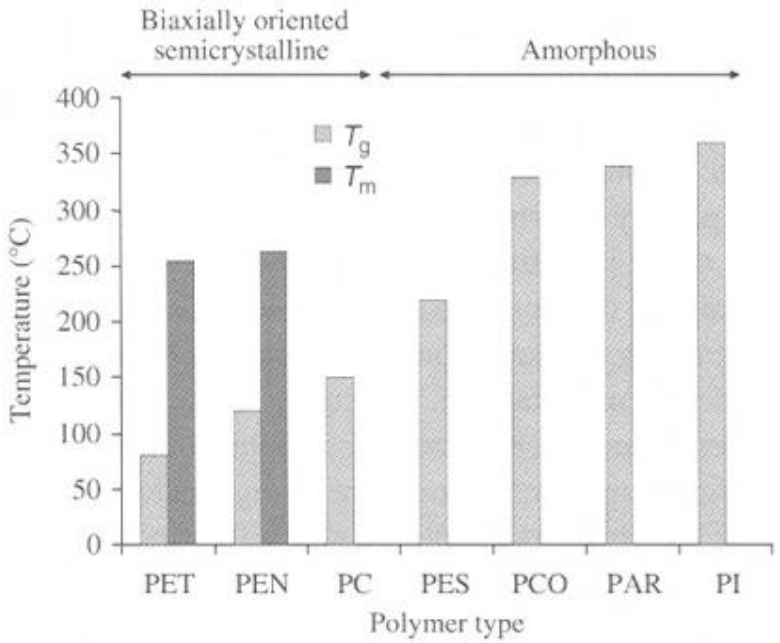


Figure 2.1 Comparison of a range of plastics by glass transition

Flexible plastics are not as thermally stable as glass or metal

New Semiconductors

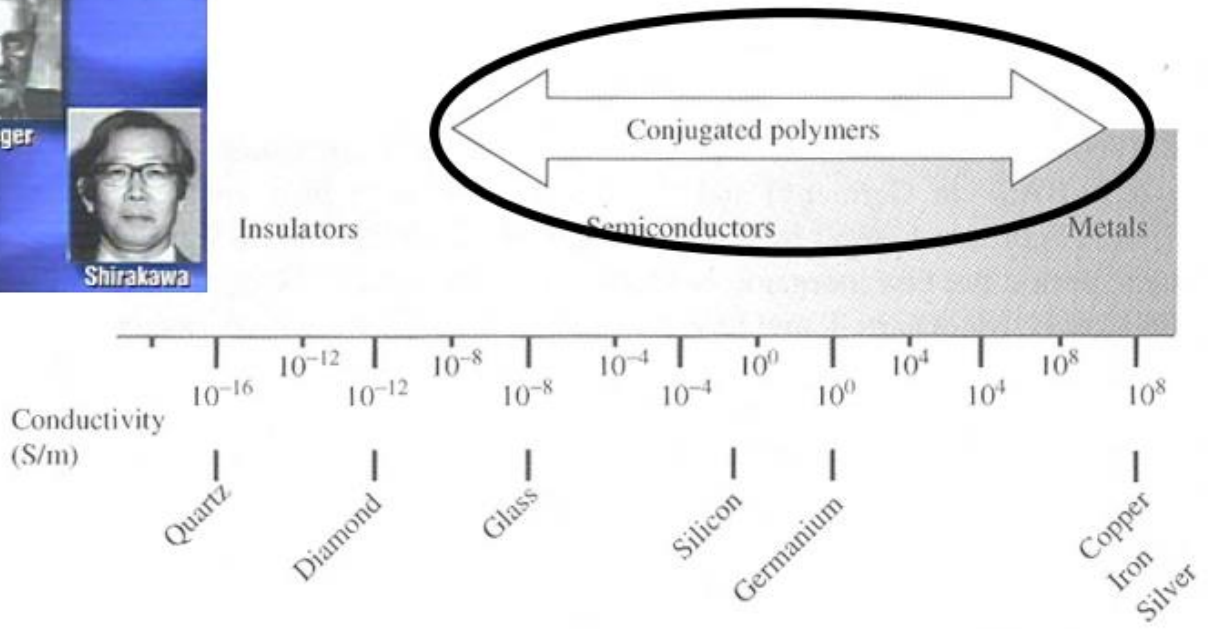


Figure 8.3 Conductive polymers within the conductivity spectrum

Polymers can be used a semiconductors and even doped to be conductors

TFT's

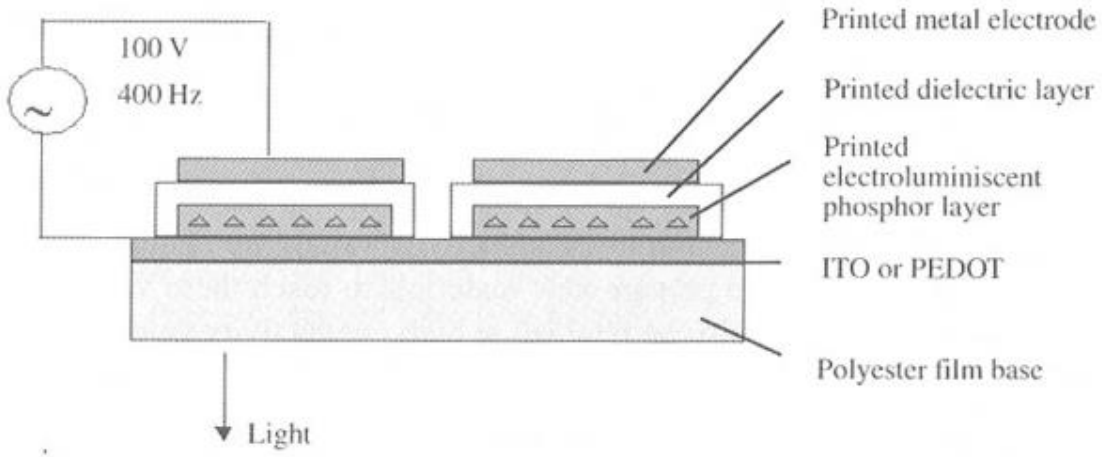


Figure 8.9 PEDT/PSS as electrode material in electroluminescent lamps: surface resistance = 60–2500 Ω/sq and transparency = 85%

- TFT's on flexible substrates can be produced from polymeric or inorganic semiconductors using printing methods

Barrier Layers

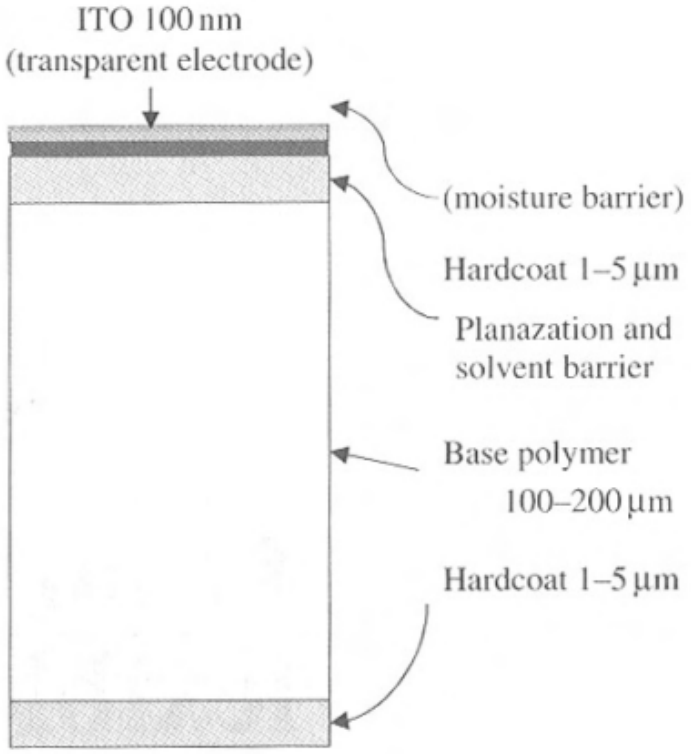


Figure 6.1 Generic substrate structure

- Barrier layers are needed to protect the various components from the environment

New Patterning Methods

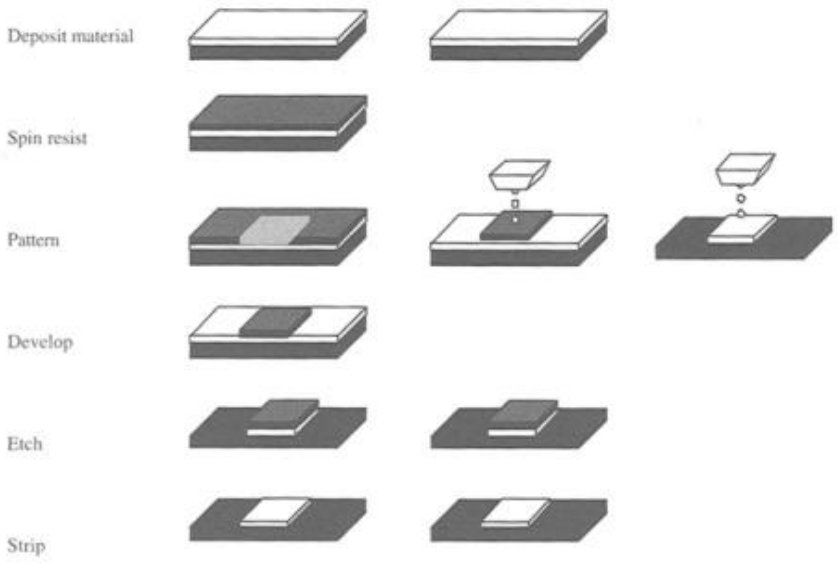


Figure 12.15 Advantages of printing organic electronics. The first column depicts a typical lithographic process. Subject material is deposited on the substrate. Photoresist is applied, exposed, and developed. The subject material is etched and the photoresist is stripped. The second column depicts a subtractive printing process. Subject material is deposited on the substrate. A mask is printed and the subject material is etched. The resist in then stripped. The third column depicts an additive printing process in which an ink carrying the subject material is printed only where necessary

- New processing is enabled by new materials

Future Prospects

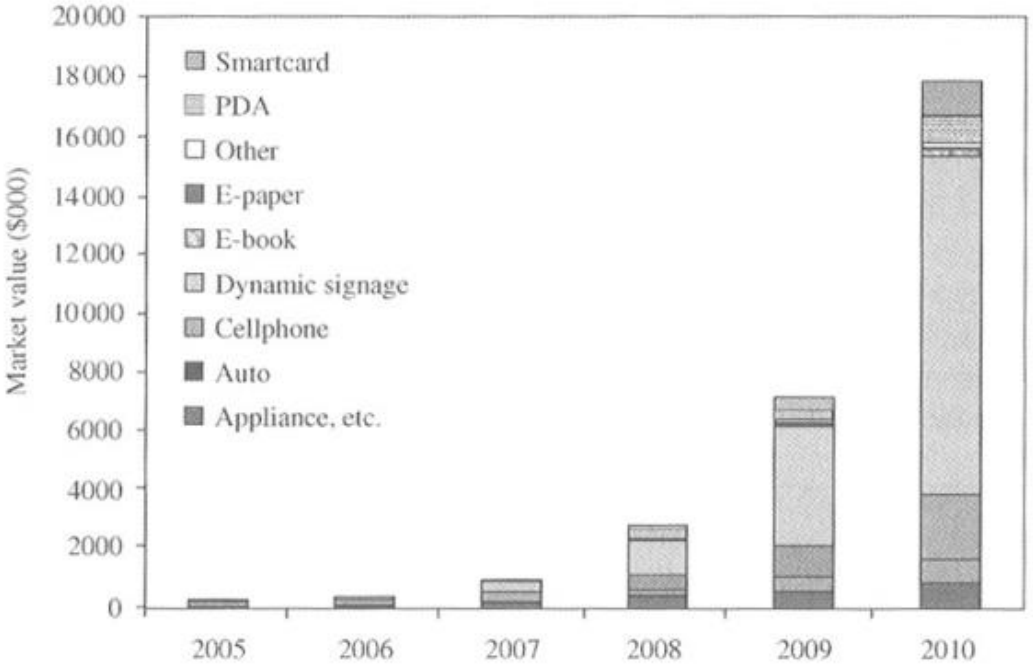


Figure 25.3 Flexible display value by application, 2005–10

- Future applications not even imagined do not appear here

Flexible Display Initiative
Degrees of Flexibility Goals

Rollable
Max. area in
min. volume
Mod. Rugged

Paper like:
Lt weight
Max. rugged
Fits in pocket

Conformal
soldier equipment
fixed curve: min.
rugged, Mod. weight
and volume.

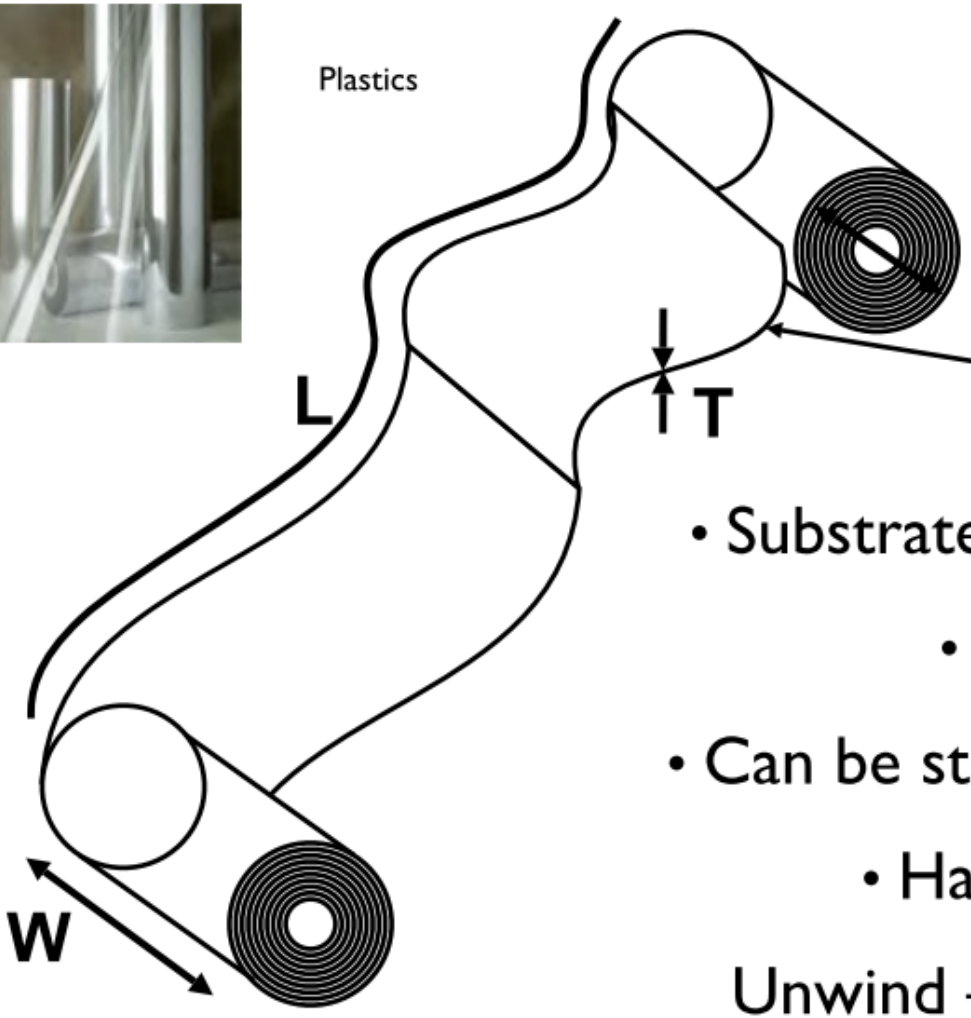
Flexible
wearable,fabric
Moderate rugged
Min Volume

Glass commercial
rigid substrates:
fragile, bulky, heavy

What is Roll-to-Roll (R2R)?

Plastics

Steel



- Substrate is a Flexible format
- L>>W>>T
- Can be stored in coils (D<1m)
- Handled in Rolls:

Unwind – process - Windup

OBLASTI

Uvod- Šta su organske tehnologije, Organska elektronika i zašto se proučava

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Organski poluprovodnici-istorijski pregled, kristalni, polikristalni i amorfni organski poluprovodnici, Transport nosilaca, Spontana i stimulisana emisija, Prenos energije i ekscitacija.

Fotonaponske komponente- Solarne ćelije-princip rada i materijali **–Fotodiode-Fotonaponski moduli i paneli**

Organski LEDs,-OLED diode- osnovne structure I injekcija naelektrisanja -princip rada-tehnologija materijala i proizvodnje

Organski LED displeji, aktivni i pasivni matrični displeji- princip rada-tehnologija materijala i proizvodnje-vrste OLED displeja-struktura-primena

Organski tranzistori- karakteristike tranzistora, parametri –primena

Kola i sistemi bazirani na organskim komponentama

Organski laseri