2016 STAM Best Paper Award

Recent Progress of High Performance Polymer OLED and OPV Materials for Organic Printed Electronics

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Recent Progress of High Performance Polymer OLED and OPV Materials for Organic Printed Electronics

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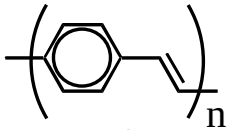
R&D on Printed Electronics Materials of Sumitomo Chemical

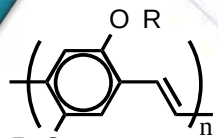
Polymer Technology

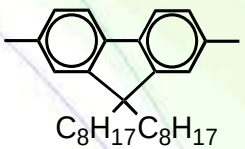
Conducive Conjugated Polymers 1981~1991

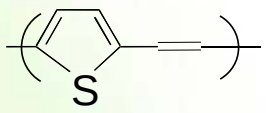


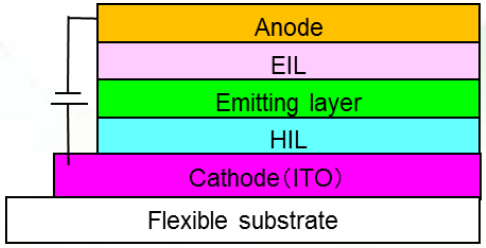
Oriented PPV : 10^4 S·cm-1

Semi conducive Conjugated Polymers 1991~

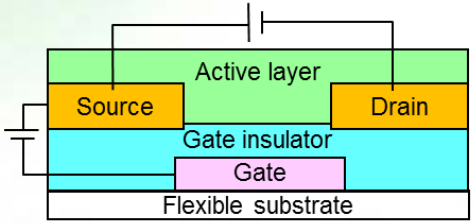




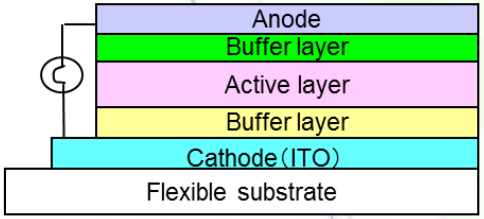




Polymer OLED



Organic transistor



Organic Photovoltaic

Materials — **Emitter** | **Semiconductor** | **Photoelectric convertor**

Devices — **Structure, Electrode, Encapsulation**

Printing — **Inkjet, Coating, R to R**

Highlight (Polymer OLED)

$$\eta_{ext} = \gamma \times \eta_{eh} \times \Phi_{ph} \times \kappa_{oc}$$

η_{ext} : External QuantumEff.
γ : Charge Balance
η_{eh} : Exciton Formation Ratio
Φ_{ph} : PLQE
κ_{oc} : Outcoupling

Loss of Carrier Balance

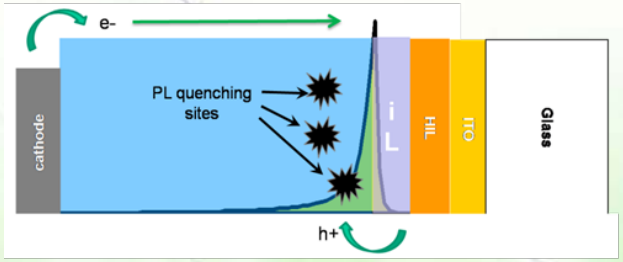
γ : Charge Balance
η_{eh} : Exciton formation ratio

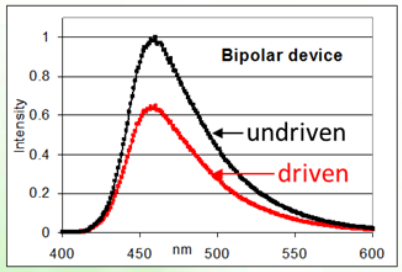
Process BEFORE exciton formation

Decay of Photo Luminescence

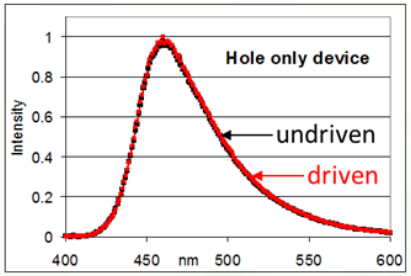
Φ_{ph} : PLQE

Process AFTER exciton formation

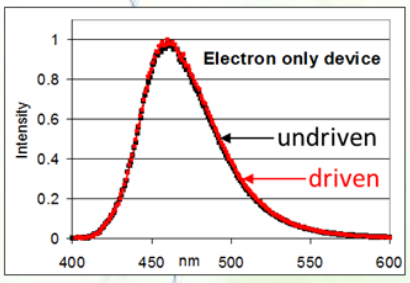




Bipolar



Hole-only



Electron-only

-Decay of photoluminescence caused by quenching site generation is main factor of lifetime.
-Decay of PL is NOT caused by charge carrier only, BUT caused by exciton formation.

(IMID2016, NoG15-1)

Highlight (Polymer OLED)

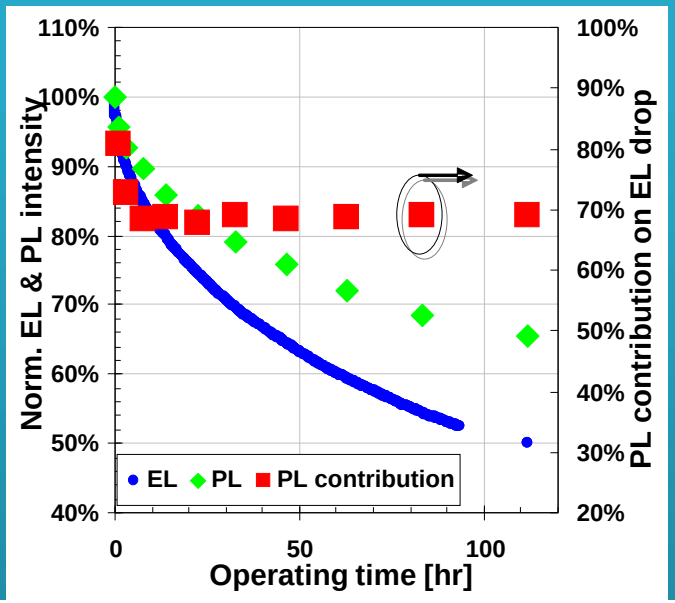


Figure 6. Degradation curves of EL and PL peak intensities of EL device containing a blue polymer during constant-current operation. Device structure: ITO/ HIL/ IL(20 nm)/ LEP(60 nm)/ cathode.

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Innovative Trends of PE

JAPERA

Japan Advanced Printed Electronics Technology Research Association

"Basic Process Technology for Customization"
"Flexible Multi-functional Device Technology"

(http://www.nedo.go.jp/english/news/AA5en_100064.html)

oe-a

Organic and Printed Electronics Association

Hybrid Electronic Systems
;combining printed and flexible electronics with classical silicon components which enables a bigger range of new applications. (http://www.oe-a.org/workinggroups)

FlexTech Alliance
a semi strategic association partner

FlexTech Alliance Receives $75M Department of Defense Award To Create and Manage a Flexible Hybrid Electronics Manufacturing Facility. (Aug. 28, 2015) (https://flextech.org/)