



Flexible and printable organic optical devices

January 18, 2008

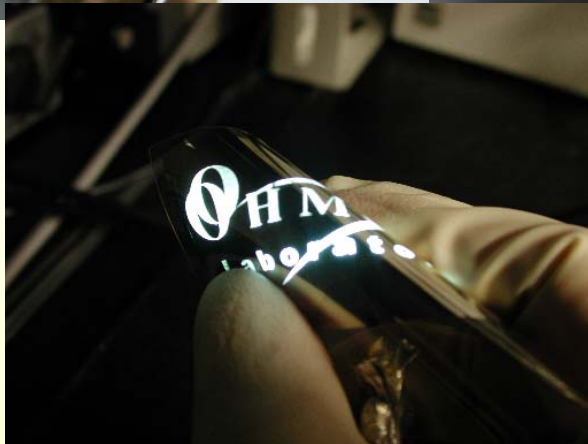
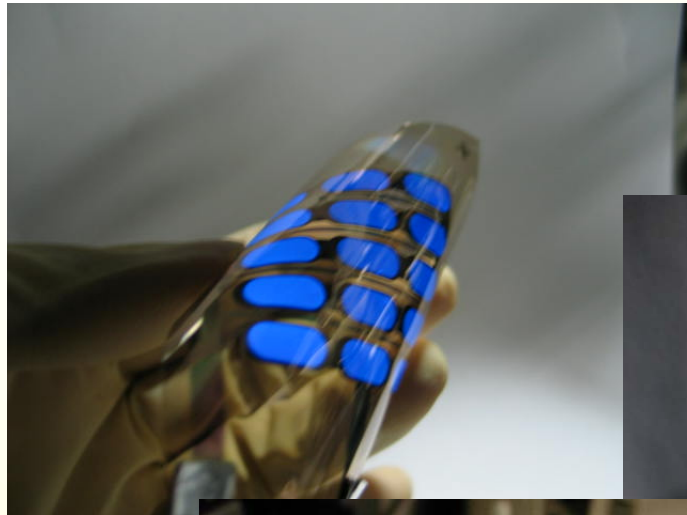
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Flexible OLEDs

Large-area device
fabrication



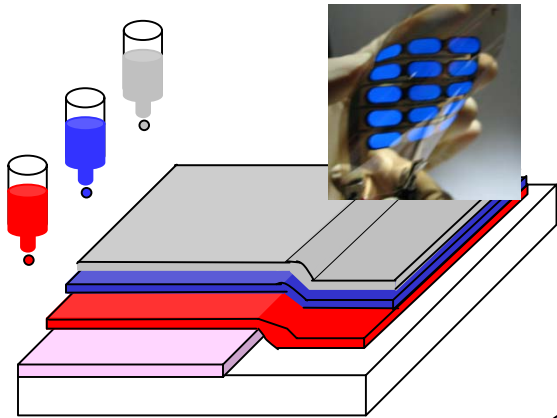
- Printable device
- Flexible device

At present, research and development of organic electro-optical devices has been rapidly performed on a global scale with the aim of creating new soft electronics based on organic molecules with π bonds .

Motivation and Research themes

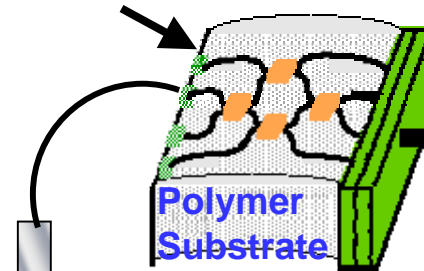
Organic devices

Printable, flexible

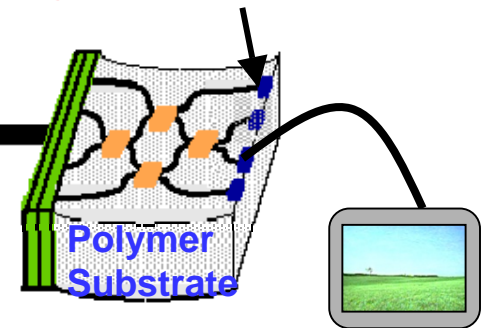


Application

Organic Light Emitting Devices



Organic Photodetectors



Optical link devices



Viewpoints of frequency response

ms order:
Liquid crystal



μs order
Organic EL devices



ns order
?
Optical sensor

+ Si devices

Organic LEDs (OLEDs)

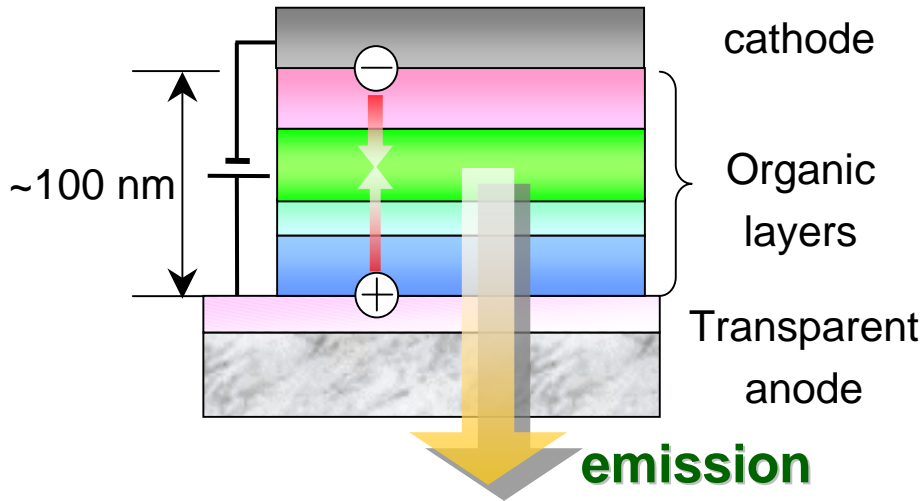


Fig. Typical OLED structure

- Simple structure
- Thin and lightweight
- Fabricated by wet processing (solution process)

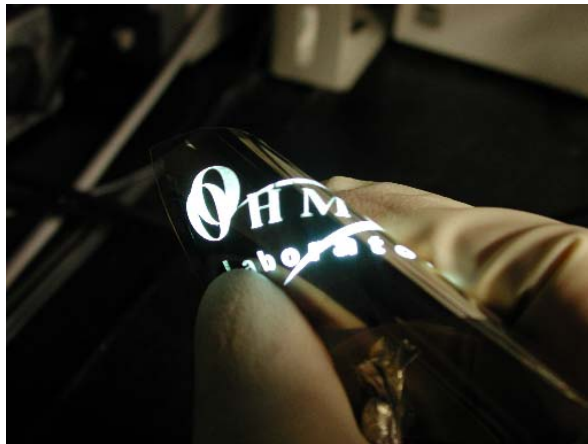


Fig. Flexible OLED device

Broad emission spectrum



By mixing different materials,

easy to realize white emission

Mechanism of OLED emission

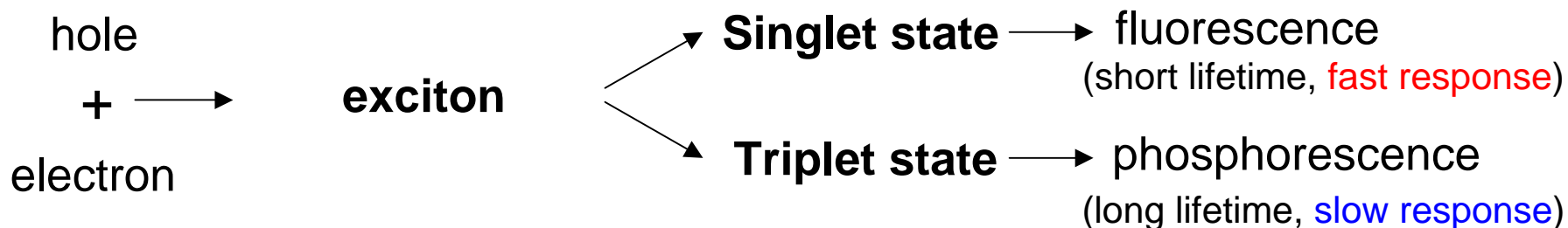


Table. Comparison of emissive materials

	Emission process	response	Material in this study
Fluorescent material	Fluorescence	~ ns	PFO, DCJTI etc.
	Delay fluorescence	10 ~ 100μs	Eu(dbm) ₃ phen etc.
Phosphorescent material	Phosphorescence	~ μs	Ir(ppy) ₃ , Ir(piq) ₃ , FIrpic

Application I

White emission by blending two or three colors.

Ex. Red + Green + Blue \longrightarrow White

Red + Blue \longrightarrow White

Evaluation of response characteristics of emitters.

Application for “Color-tunable OLEDs”

Color adjustment for full-color displays

Color-tunable lighting devices

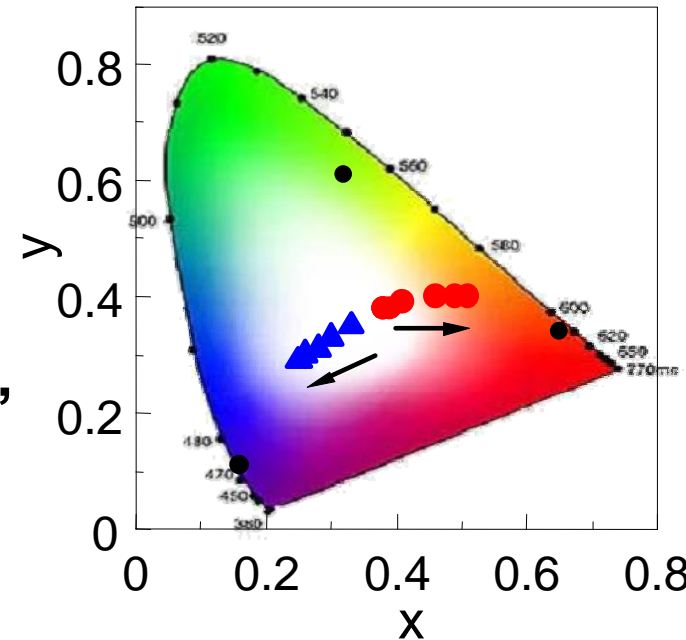
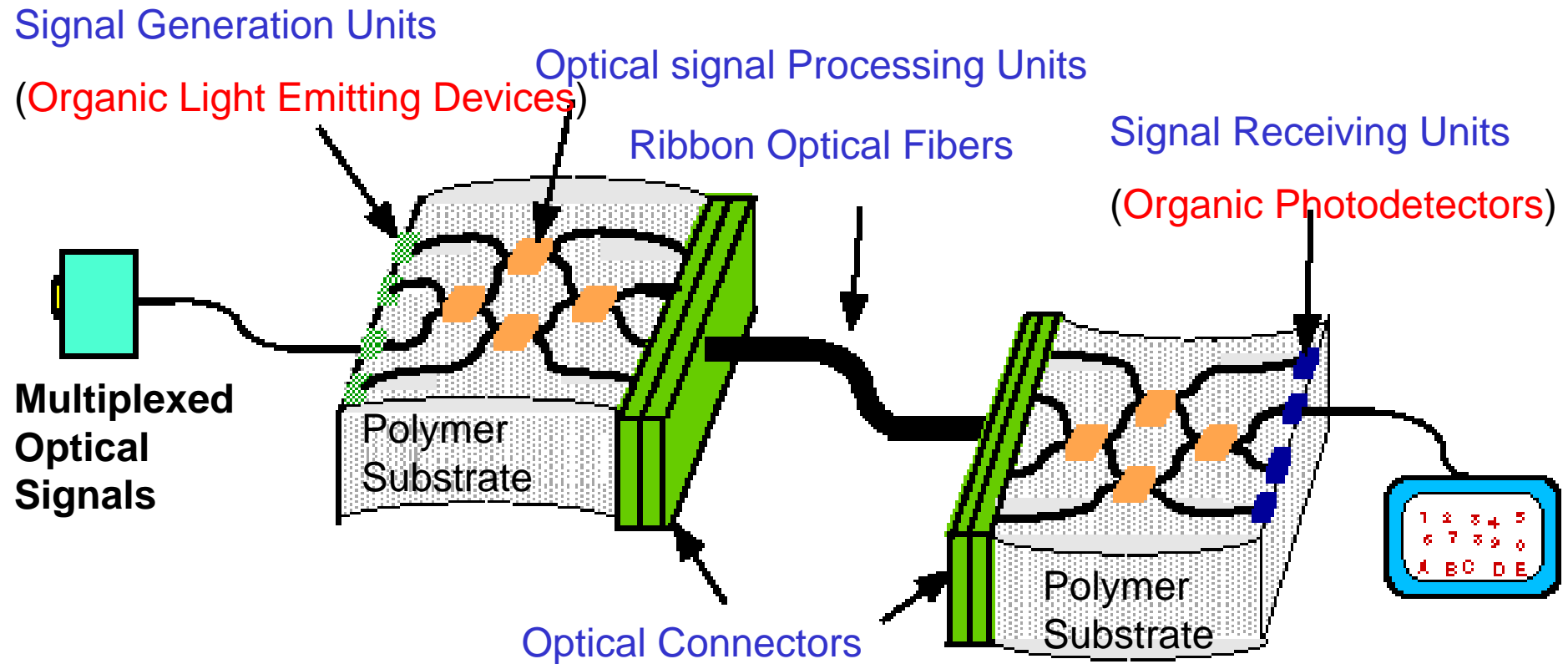


Fig. Changes of the CIE coordinates at pulse drive



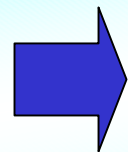
Application II



• Organic Light Emitting and Receiving Devices (OLED/LD/PD)

• Polymeric Waveguide

• Plastic Optical Fiber (POF)



Flexible Electro-Optic Integrated Devices

Research Unit

Fabrication and characteristics of flexible and printable OLEDs and OPDs

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