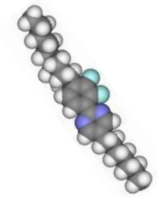
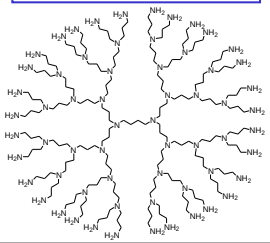
Functionalization of liquid crystal and polymer materials

Professor Koichiro Yonetake

Liquid crystal



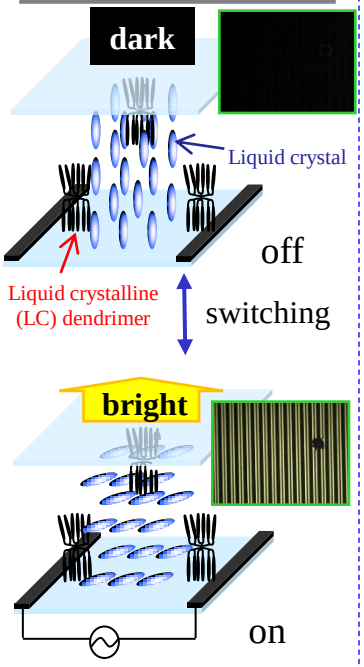
Dendrimer



Polymer

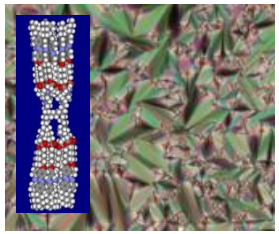
- **Liquid crystalline polymer**
- **Polarising film**
- **Poly(lactic acid)**
- **Polyimide**

Alignment-layer free liquid-crystal display

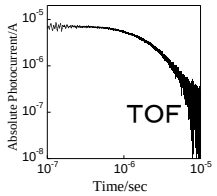


LDVA mode

Organic semi-conductor



LC dendrimer — Smectic liquid crystal

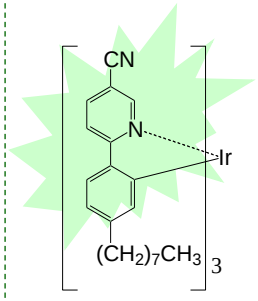


carrier mobility

$\mu = 1.04 \times 10^{-2} cm^2/Vs$

Thermodynamically stable smectic phase at temperature range from RT to 1000°C.

Liquid crystal / organic EL device



Light-emissive LC

Dual mode display

Content :

Dendrimers are well defined, highly branched, and three-dimensional polymers. Moreover, the large number of reactive end groups existing at the periphery of dendrimers easily react with many reagents to give dendrimers with various functionarities. The dendimer exhibits liquid crystalline (LC) nature by introducing mesogenic units as end groups, and it forms cylindrical or disk-like molecular shape. The cylindrical LC dendrimer spontaneously stands perpendicular to a substrate.

Using the spontaneous homeotropic alignment of LC dendrimer, we have successfully developed a novel liquid crystal display which omits polyimide alignment layer and has superior properties in brightness and Vmax value.

Dendrimers peripherally introduced by LC derivatives having carrier transfer property form thermodynamically stable smectic structure at temperature range from room temperature to ca.100°C, and they exhibit high carrier mobility around $10^{-3} cm^2/Vs$. They are expected to be an organic semiconductor. We have also developed liquid-crystalline organic EL device: LC/OLED dual mode display.

Yamagata University Graduate School of Science and Engineering
Research Interest : Structure and Physical property of Liquid crystal and Polymer
E-mail : yone@yz.yamagata-u.ac.jp
Tel : +81-238-26-3045
Fax : +81-238-26-3047
HP: http://yone.yz.yamagata-u.ac.jp/