Development of high-performance organic optoelectronic devices by controlling molecular orientation

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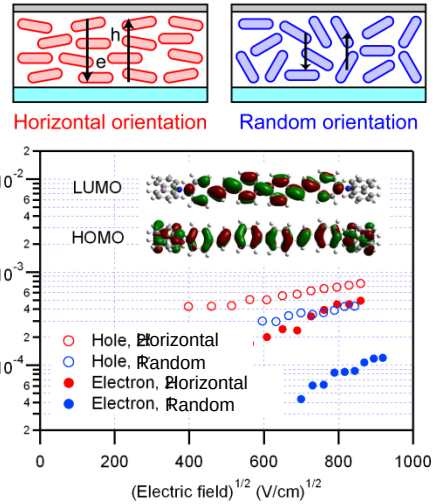
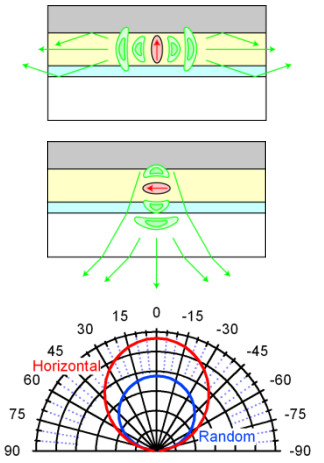
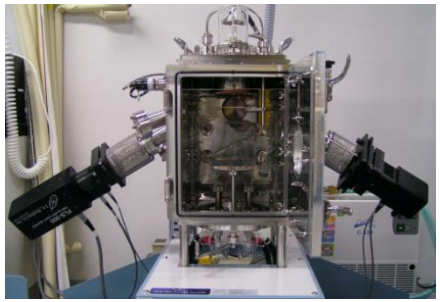
Improvement of device performance by control of molecular orientation



Dependence of carrier (hole and electron) mobilities on molecular orientation in films



Enhancement of the emission from organic LEDs using molecular orientation



Analysis of optical property and molecular orientation

Deposition system equipped with ellipsometer for the analysis of optical property of films

Content :

The research in organic thin-film devices such as organic LEDs has been conducted worldwide for the development of the next-generation optoelectronic devices having many advantages of flexibility, easy fabrication process, variety of material design, etc. However, much lower carrier mobilities in the organic devices than those in inorganic semiconductors remains as a problem to be solved.

In our study, the significant improvement of the carrier mobilities are being investigated by controlling the molecular orientation in devices (see the upper-left figure). In addition, the further improvement of the device performance can also be expected by controlling the direction of emissions from molecules (see the upper-right). Combining the multiple techniques of device fabrications, optical analysis of thin films (see the lower), optical simulations, and quantum calculations of molecules, we are now trying to clarify fundamentals in organic devices for future applications.

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Research Interest : Organic optoelectronics

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