

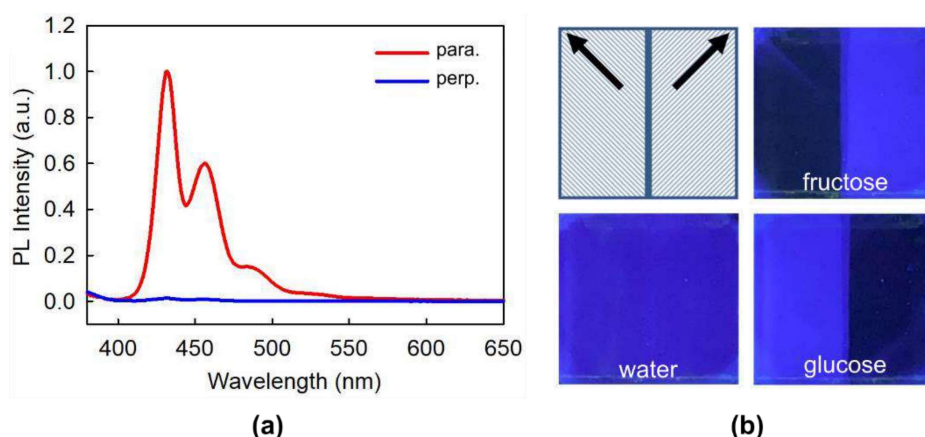
## Chiral Detection by Mesogenic Luminophore with Orthogonally Polarized Emission

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Chiral detection has attracted great interest in bio-applications such as diabetes diagnosis. Fructose is known as a monosaccharide closely related to diabetes, which is an isomer with the same molecular formula as glucose but with a different structure. Optically, glucose and fructose exhibit different optical activities by their circular birefringence due to different chirality [1]. Glucose rotates linearly polarized (LP) light clockwise (dextrorotatory) but fructose rotates it counterclockwise (levorotatory). In this work, we demonstrate chiral detection in a single substrate with orthogonally polarized emission from aligned mesogenic luminophore. The mesogenic conjugate polymer, poly(9,9-di-n-octylfluorenyl-2,7-diyl) (PFO), was used as emission material on an orthogonally rubbed surface. As shown in Figure 1(a), the aligned PFO on the  $\pm 45^\circ$  rubbed alignment layer emitted the LP light with high ratio of linear polarization about 72 at 432 nm. The orthogonally polarized light is indistinguishable passing through water as a solvent of both glucose and fructose under  $0^\circ$  linear polarizer as shown in Figure 1(b). On the other hand, levorotatory fructose rotates both LP lights counterclockwise about  $45^\circ$  and thus right region changes brighter than left region. However, dextrorotatory glucose rotates them clockwise and thus left region is brighter than right region.



**Fig. 1. (a) PL spectrum of the orthogonally patterned polarized emission and (b) PL textures passing through water, fructose, and glucose under  $0^\circ$  linear polarizer.**

In general, the rotating angle ( $\phi$ ) by optical activity is linearly proportional to a concentration ( $c$ ) of glucose or fructose following as [2],

$$\phi = \alpha \times c \times L, \quad (1)$$

where  $\alpha$  and  $L$  are specific rotation and path length of solution. Therefore, both isomers can be identified by brighter region and their concentration can be estimated by measuring the rotating angle.

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### References

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