

ヒドロキシプロピルセルロース液晶の反射型ディスプレイ

It is known that HPC aqueous solution has a cholesteric liquid crystal phase in which the light of a certain wavelength can be reflected selectively. The molecules in the cholesteric phase align as a spiral structure that gives rise to the selective reflection. The dominant wavelength of the reflection coincides with the pitch of the spiral. And a bright and colored reflection depending on the pitch can be observed. Because the selective reflection wavelength of HPC depends on a concentration of additive ions, the color of the HPC solution can be changed by an applied electric field that can move ions.

One of the main problems is how to make a sample with well-oriented molecules. So far, samples have been prepared by applying pressure to the liquid crystal, injecting it into a tube and aligning it with rubbing stress with surface of the tube. This conventional tube cell is made of PVC (polyvinyl chloride) tube (50.0mm in length). The color of the cell has been changed from blue to red for 36 hours by applied voltage. The reflected light of this cell, however, was not circularly polarized and the orientation of the cell was not very good.

A liquid crystal cast film with high crystallinity and good alignment was prepared and compared with the conventional cells. By drawing the liquid crystal on the slide glass slowly using gravity, a sample with very good orientation was obtained. The reflected light of this cast film is circularly polarized and shows clear optical activity. Furthermore, as a result of polarization analysis, uniform and large optical anisotropy was observed throughout the cast film. From these results, it was found that the orientation of the cast film was very good. Since cast film is open on one side, addition and removal of additive ions can be easily performed, so application to variable color devices can also be expected.

