

Prime Minister Prize and Invention Implementation Achievement Award

Wide Viewing Angle Birefringent Film for LCDs

Invention Name: Patent No.2818983 (Birefringent Film Manufacturing Method)

== Date of Award ==

July 1, 2005

== Award Recipients ==

- Prime Minister Prize
YOSHIMI Hiroyuki
NAGATSUKA Tatsuki
FUJIMURA Yasuo
OSUGA Tatsuya
- Invention Implementation
Achievement Award
TAKEMOTO Masamichi

== Features of Award ==

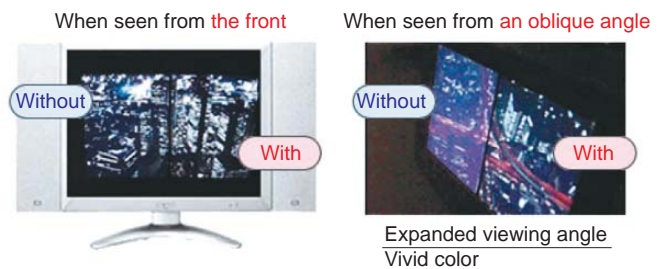
The National Commendation for Invention, which was awarded for the first time in 1919 as the Imperial Commendation for Invention, is given to inventions that are recognized to exhibit superior levels of scientific and technological progress, significant operational enhancements, and which have contributed to scientific and technological progress as well as industrial promotion.

== Reason for Award and Product Outline ==

The basic structure of a typical liquid crystal display (LCD) is such that a polarizing film and an optical compensation film (birefringent film) are located on the backlight side and the viewing side respectively of the liquid crystal cells.

Although there are demands for LCDs to provide greater black/white contrast in order to obtain more vivid display characteristics and improve color reproducibility, conventional LCDs are plagued by a phenomenon whereby black images appear colored when the screen is viewed from an oblique angle, which results in a decrease in contrast and color. One way of solving this problem is to use birefringent film. When designing this film, if the maximum lateral refractive index is n_x , the minimum lateral refractive index is n_y and the thickness refraction index is n_z , then the formula of the birefringent film will be $n_x > n_z > n_y$ and it is necessary to place the birefringent film between the LCD cells and the polarizing film.

With this newly invented manufacturing method it is possible to mass-produce birefringent film with the abovementioned properties, something that was not possible until now. More specifically, a layer of heat shrinkable film with controlled shrinkage characteristics is applied to one or both sides of a resin film using Nitto Denko's proprietary adhesive technology, stretched under heat and then the shrinkable film is removed. By means of this process, the resin film acquires the designated values to become birefringent film. This film has contributed to the creation of an LCD market currently valued at approximately ¥4 trillion and it is thought that in the future that demand will continue to increase for VA (Vertical Aligned) mode and IPS (In-Plane Switching) mode LCDs in addition to LCDs used in mobile phones.



Effect of birefringent film