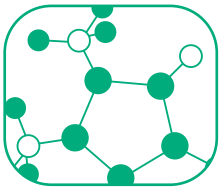
Material Technologies: the Core of Technological Assets Supporting Business Diversification

Fujifilm's world-class material technologies, which the Company has nurtured over 70 years of advances in photographic film expertise, include functional compound molecular design, chemical reaction control and organic synthesis technologies. These unique technologies have been utilized for flat panel display (FPD) materials, graphic arts materials, semiconductor materials and the life sciences field, all of which have growth potential.



Color Films: Chemical Art Works

Photographic films are manufactured using very thin, transparent cellulose triacetate (TAC) films as a base material. A TAC film is uniformly coated with an ultra-thin emulsion layer of an approximately 15-micrometer*1 thickness—roughly equivalent to one-fifth of a human hair—to make a photographic film. The emulsion layer actually consists of a dozen layers containing about 10 types of silver-halide grains and more than 100 types of organic compounds. The shape and size of silver-halide grains determine the sensitivity of films (ability to respond to light radiation in different capacities) and color reproducibility (property to record in accordance with different light qualities). Also, in these layers, exceptionally sophisticated material technologies are applied to enable specified nanoscale layers to reproduce colors. **Due to such high technological hurdles, in the past only a few photographic film manufacturers existed throughout the world.**

In addition, photographic films, which employ light and developer to reproduce beautiful color images, are a treasury of chemical reaction control technology. For example, a restrainer, which is adsorbed into grains of the emulsion layer uniformly in advance, is released from silver-halide grains when exposed to light. In this and other phenomena, through precise control of chemical reactions, ultra-fine grains realize vivid color reproduction and high-sensitivity, thereby creating richly gradating, quasi-three-dimensional images. At present, Fujifilm applies chemical reaction control technology in the development of advanced photopolymer and photoresist materials.

Moreover, Fujifilm excels in organic synthesis technology, which is applied in the industrial production of designed molecules, and thin-layer coating and high-speed simultaneous multilayer coating technology, which it has accumulated through the development of photosensitive materials. **These production technologies underpin the Company's high-quality products and cost competitiveness.**

*1 One-thousandth of a millimeter

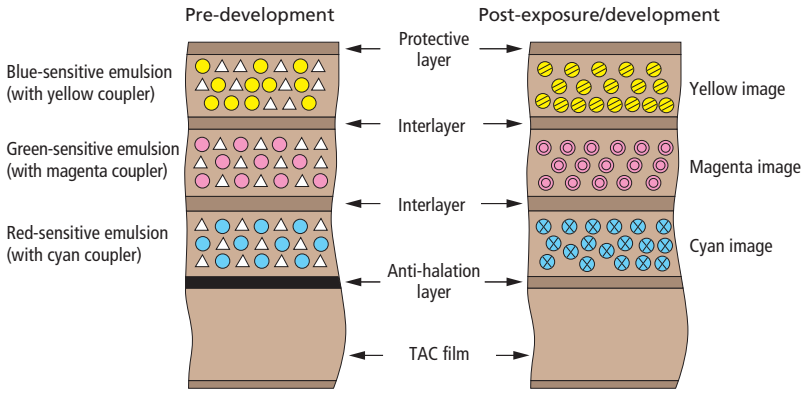
Refining Unique Technologies for Technological Superiority

Since the release of wide-view (WV) films in 1995, Fujifilm has applied film formation and coating technologies, which it has fostered through the development of photographic films, to bolster the technological superiority of these products as a key component of twisted-nematic (TN)-mode liquid crystal displays (LCDs). WV films have, in turn, significantly contributed to the Company's profitability. With their innovative concept of expanding viewing angle just by sandwiching a liquid crystal layer with them, WV films solved the TN-mode LCD's weak point, which continued for over two decades—namely, "narrow viewing angles."

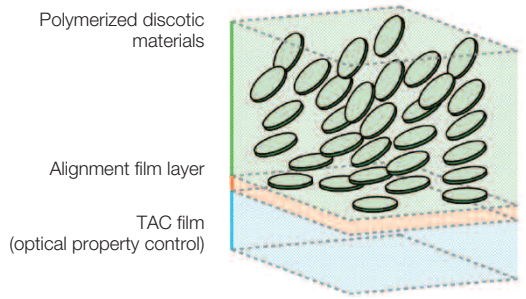
To render images on a TN-mode LCD, a voltage is applied to a liquid crystal layer, which is sandwiched by polarizers, and the direction of light penetration is altered. However, because certain liquid crystal molecules are slanted, when a voltage is applied, some light leaks from the polarizers, and this results in lower contrast and clarity of images on the display. WV films, which sandwich a liquid crystal layer, compensate slanted light leakage with their discotic compounds, thereby expanding the viewing angle.

Prior to successfully commercializing its WV films, Fujifilm made a number of improvements. Specifically, the Company achieved a reflective symmetry alignment of polymerized discotic materials by controlling the hydrophobic/hydrophilic balance of the compound alignment structure.

Photographic Film Composition



WV Film Composition
(Ideal, Simplified Model)



Awards Received for WV Films

- "Advanced Display of the Year 1996" at FINETECH JAPAN
- "JCIA Technology Award" (1998) by Japan Chemical Industry Association (JCIA)
- "The Photopolymer Science and Technology Award" (2002) by the Society of Polymer Science, Japan (SPSJ)
- "Advanced Display of the Year 2008, Grand Prix in the Components and Materials Category" at FINETECH JAPAN
- "Display Component of the Year Silver Award" (2008) by the Society of Information Display (SID)

Then, we finally attained a film of just 2-micrometers in which polymerized discotic materials are aligned consecutively in the direction of the thickness, with gradually slanted angles.

Moreover, to address the need for clearer imaging, we completely eliminated factors that caused disturbed alignments of polymerized discotic materials in production processes. Also, we achieved nanometer*2 coating thickness control to prevent the slightest irregularity in film thickness. Thanks to technological accumulation through these activities, **we have filed many applications for WV film-related patents. Fujifilm's 100% global market share for WV films** today is simply attributable to the Company's endeavors to keep refining its technological portfolio and persistently pursue higher product quality.

*2 One-millionth of a millimeter

New Departure toward Improved "Quality of Life"

Fujifilm applies its proprietary FTD technologies—the integration of its material technologies—in the life sciences field. The acronym "FTD" stands for "**F**ormulation, **T**argeting and **D**elivery," which involves formulating functional pharmacological ingredients and materials that provide delivery of appropriate doses in a timely manner, targeting specific areas of the body and maintaining a fresh and stable condition for sustained efficacy.

Fujifilm's ASTALIFT functional cosmetics series use astaxanthin, which the Company selected based on knowledge of material chemistry that it has long accumulated through photographic material advances. Astaxanthin is a highly functional antioxidant carotenoid that deactivates active oxygen—a major cause of rough, dry skin and loss of skin elasticity. However, we had an issue to solve: it is difficult for astaxanthin by itself to penetrate into skin layers. To solve this issue, we microparticulated astaxanthin to reduce the diameter down to 30 nanometers, in addition to raising the stability of astaxanthin nanoparticles through the application of our unique emulsification and micro-dispersion technologies. Then, we encapsulated an astaxanthin particle with an ultrathin membrane to prevent its aggregation. These steps proved effective, enabling us to enhance astaxanthin penetration into the skin. In addition, by using the antioxidation technology, we improved the shelf life of the ASTALIFT series.

Fujifilm believes that its FTD technologies, along with a library of some 200,000 compounds, will create other new possibilities and value. Specifically, in pharmaceutical fields, the Company will be able to develop drugs whose active ingredients are effectively delivered to the affected part of the patient's body, as well as to develop more patient-friendly drug delivery methods. When this is accomplished, it will expand the possibilities for us in new drug development, thereby maximizing the value of our drug pipeline. Also, we expect that the integration of our world-class organic synthesis technology will allow us to better control drug efficacy and toxicity.

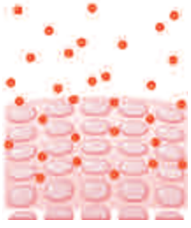
ASTALIFT Series

Fujifilm's Nanotechnology "FTD Technology"

Conventional Astaxanthin Solution

Combined astaxanthin particles are hard to penetrate into the skin.

Fujifilm's Nano-Particulated Astaxanthin Solution



Microparticulated astaxanthin is easily absorbed into the skin.