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Zeon develops new material for creating innovative visual effects
Broadband cholesteric liquid crystals arise from application development in the optical film business

Zeon Corporation (Zeon; head office: Chiyoda-ku, Tokyo; President and CEO: Tetsuya Toyoshima) has developed a new material with innovative visual effects, drawing from its proprietary technologies in its optical film and other businesses.

This new material is a broadband*¹ cholesteric liquid crystal*² material that can produce various visual effects from reflected light. The helical pitch of the cholesteric*² structure is controlled at the nano level using Zeon's uniquely designed liquid crystal material and special coating process. Zeon has achieved development of a film made from this material with an ultra-precisely controlled structure as well as printing of flakes of the pulverized film, both of which can produce innovative visual effects. The new material is therefore expected to be used for unprecedented design applications and anti-counterfeiting due to its proprietary manufacturing technology, with the potential of displaying visual effects that are both delightful and functional.

At present, the new material is in the R&D stage, and development is underway for cultivating future markets.

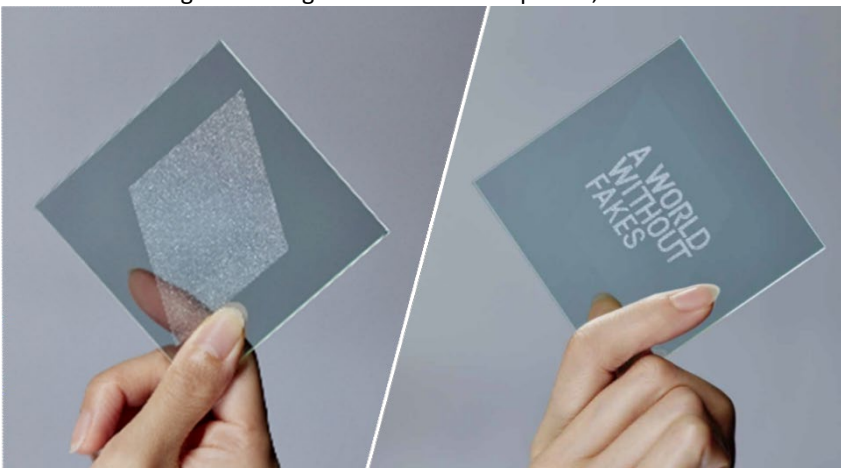
*1 The wavelength of the reflected light extends across a broader bandwidth than visible light.

*2 Molecules are arranged in a helical structure, and the color of reflected light varies according to differences in helical pitch.

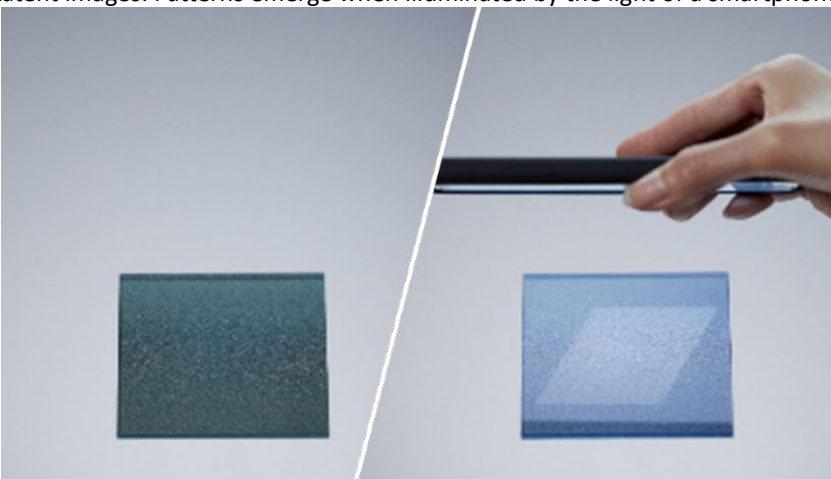
Zeon is actively pursuing businesses in completely new fields beyond its existing business domains. We consistently challenge ourselves to resolve social issues and realize a sustainable world by developing unique technologies and products.

Three distinctive visual effects

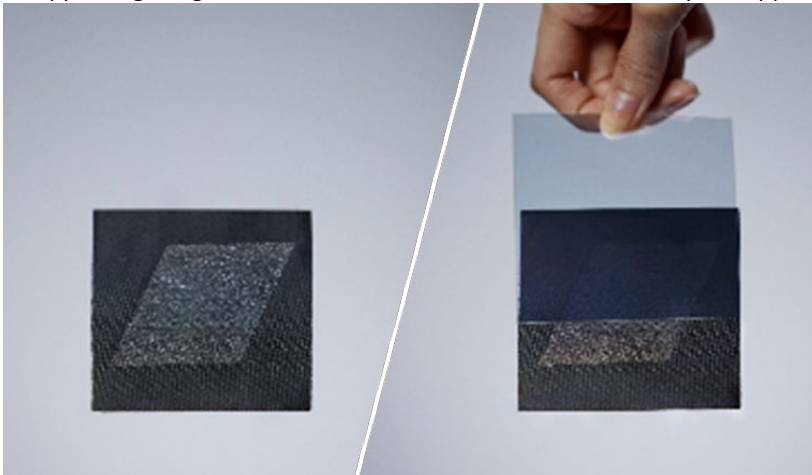
1. Double-sided images: Although the sheet is transparent, the front and back display different image patterns.



2. Latent images: Patterns emerge when illuminated by the light of a smartphone screen or viewed through a polarizing filter.



3. Disappearing images: Patterns and colors visible to the naked eye disappear when viewed through a polarizing filter.



Material characteristics

1. Extraordinary versatility and designability
Flakes can be printed using screen printing and other techniques, facilitating application to curved surfaces with no limitations to the design of the latent image, and a variety of designs can be produced.
2. Abundant color variations
A wide range of colors can be produced. Nano-level control of the helical pitch of the cholesteric structure makes it possible to vary the color of reflected light from long wavelength red to short wavelength blue-violet, and from pale to dark. It is also possible to simultaneously reflect all visible light to produce a silver*³ (colorless metallic luster).
3. Metal-free
Because no metal is used for the metallic luster appearance, the material can be applied to items worn by those who have a metal allergy.
4. High inimitability
The application of Zeon's proprietary material and special manufacturing process ensures that images are extremely difficult to imitate.

*3 The world's first (according to in-house research by Zeon) silver coloration of a single-layered thin film without metallic components.

Potential applications

- Works of art
- Clothing and accessories
- Entertainment uses

Original idea for the research

This technology was inspired by the biomimicry of *Chrysina optima*, or platinum-colored scarab beetles. *Chrysina optima*, found in Central and South America, reproduces the colors gold and platinum on its body without the use of metallic components. The secret of its characteristic coloring lies in the unique optical property of its surface structure. This can reflect light across a wide range of wavelengths and almost all light in the visible spectrum, allowing the beetle to reproduce the vivid metallic luster of gold, silver, and platinum. The same mechanism was artificially reproduced in our technology. Zeon has achieved unprecedented and innovative visual effects by combining three technologies, its liquid crystal materials, coating process, and optical design, developed over many years of research.

For inquiries regarding the use of the new material, please contact us via our corporate website:

<https://www.zeon.co.jp/en/contact/>

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