

Industrial Application Guide

ColorFoil

Functional Optical Layers for Colored Organic Solar Cells

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Introduction

About this Guide

Organic solar cells are rapidly moving from laboratory research towards commercial manufacturing. As production scales, the demand for new applications extends beyond energy generation alone. Architects, product designers and system integrators increasingly require photovoltaic solutions that combine high performance with visual integration.

This guide introduces LayersTech's ColorFoil technology, a functional optical layer developed specifically for industrial organic solar cell manufacturing. It explains how ColorFoil enables colored photovoltaic devices while maintaining compatibility with scalable roll-to-roll production.

The purpose of this document is to provide a technical overview of the ColorFoil technology platform, its applications and its integration into industrial manufacturing. This guide is intended as a non-confidential introduction and does not contain proprietary material formulations or confidential process parameters.

Who Should Read this Guide

This guide is intended for professionals involved in the development, manufacturing and commercialization of organic photovoltaic products, including:

- Research & Development Engineers
- Process Engineers
- Manufacturing Engineers
- Product Development Teams
- Technical Directors
- Architects and Building Integration Specialists
- Business Development Managers

Whether your focus is developing building-integrated photovoltaics, creating visually attractive energy-generating products or expanding your product portfolio, this guide provides an introduction to how ColorFoil can enable new opportunities within organic solar cells.

About LayersTech

LayersTech develops advanced functional layers for organic solar cells with one objective: making industrial OPV manufacturing more robust, scalable and commercially attractive.

Our technology originates from years of research conducted at SDU CAPE, one of Europe's leading research environments within organic photovoltaics and functional thin-film materials.

Building upon this foundation, LayersTech develops industrially compatible functional layers that enable manufacturers to create the next generation of organic photovoltaic products.

ColorFoil represents a new class of functional optical layers designed to combine energy generation with architectural freedom, product design and industrial manufacturability.

From Laboratory Performance to Industrial Manufacturing

Over the past decade, organic solar cells have demonstrated significant improvements in efficiency and stability. As the technology moves towards commercial deployment, manufacturers are increasingly exploring applications where aesthetics become as important as electrical performance.

Traditional photovoltaic technologies often limit architectural freedom due to their appearance. Buildings, consumer products and integrated energy solutions increasingly demand photovoltaic surfaces that complement product design rather than dominate it.

Industrial manufacturing therefore requires optical solutions that combine consistent color appearance, long-term stability and compatibility with high-volume roll-to-roll production.

The Manufacturing Challenge

Introducing color into photovoltaic devices presents several technical challenges.

Manufacturers must balance optical appearance with electrical performance while maintaining production consistency across large coated areas.

Key challenges include:

- Uniform color reproduction
- Large-area optical consistency
- Process compatibility
- Long-term durability
- Manufacturing reproducibility
- Industrial scalability

Developing colored photovoltaic solutions therefore requires more than simply adding pigments or coatings. Optical functionality must become an integrated part of the photovoltaic architecture.

Why Colored Photovoltaics Matter

Colored photovoltaic devices enable applications that conventional solar technologies cannot address.

Rather than competing with the visual appearance of buildings and products, colored organic solar cells become part of the design itself.

This creates new opportunities within:

- Building Integrated Photovoltaics (BIPV)
- Architectural facades
- Consumer products
- Greenhouses
- Interior design
- Design-oriented energy products

The Industrial Opportunity

By introducing functional optical layers into the manufacturing process, manufacturers can expand their product portfolio without fundamentally changing their production platform.

ColorFoil enables new product categories while remaining compatible with scalable industrial manufacturing.

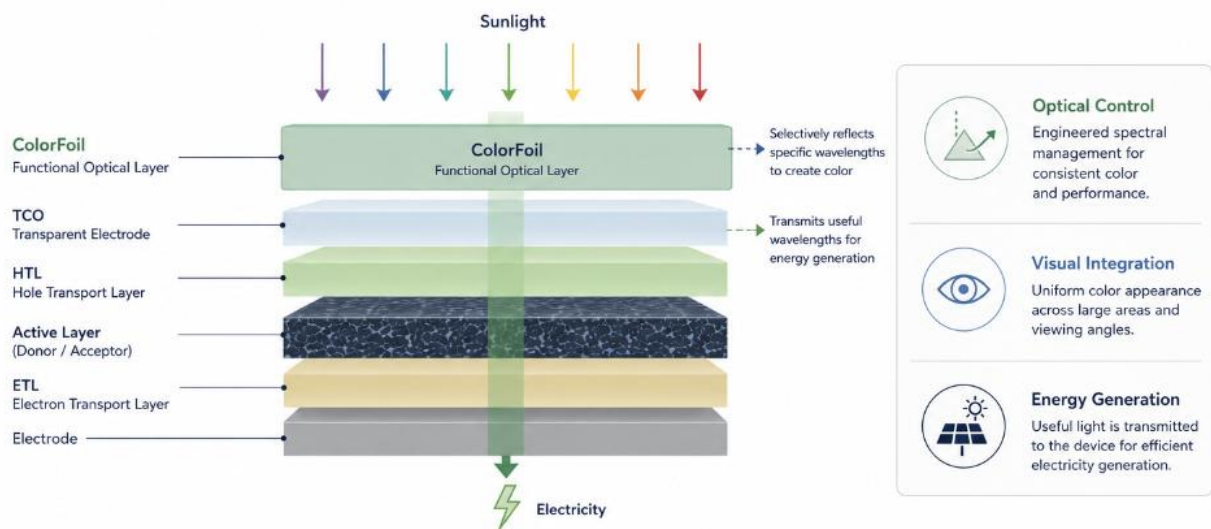
Understanding ColorFoil

ColorFoil is not a decorative coating.

It is a functional optical layer engineered to control how incoming light interacts with the photovoltaic device.

Rather than simply adding color, ColorFoil selectively manages portions of the light spectrum while allowing the remaining wavelengths to contribute to electrical energy generation.

This enables photovoltaic products that combine aesthetics with functionality.



Functional Optical Design

The optical properties of ColorFoil are engineered to deliver consistent appearance across large surfaces while maintaining compatibility with industrial manufacturing.

Depending on the application, ColorFoil can be optimized to:

- Produce uniform colors
- Reduce visual reflections
- Improve architectural integration
- Enable customized product appearance
- Support scalable production

Beyond Architecture

Although architectural integration represents an important application, the technology extends far beyond buildings.

Potential applications include:

- Building facades
- Roof systems
- Greenhouses
- Consumer electronics
- Design products
- Automotive concepts
- Urban furniture
- Smart cities

A Functional Layer with Multiple Benefits

ColorFoil creates value in several ways simultaneously.

It enhances product appearance, enables new applications and supports industrial manufacturing without introducing unnecessary process complexity.

Rather than being an additional decorative element, ColorFoil becomes an integrated functional component of the photovoltaic device.

The LayersTech Technology Platform

Product Portfolio

ColorFoil Portfolio

LayersTech offers ColorFoil solutions tailored for different industrial applications while utilizing the same scalable technology platform.

Architectural ColorFoil

Designed for Building Integrated Photovoltaics where appearance and energy generation must coexist.

Applications include:

- Facades
- Cladding
- Exterior architectural elements

Greenhouse ColorFoil

Designed to selectively manage incoming sunlight for greenhouse applications.

By optimizing the transmitted spectrum, ColorFoil can support both photovoltaic energy generation and plant growth.

Potential benefits include:

- Controlled light transmission
- Energy generation
- Climate integration

Custom Color Solutions

Some products require a unique visual identity.

LayersTech therefore supports customer-specific color development for selected industrial applications.

Choosing the Right Solution

Different applications require different optical characteristics.

Whether the objective is architectural integration, greenhouse optimization or custom product design, LayersTech works together with customers to identify the most suitable ColorFoil solution.

From Evaluation to Industrial Production

LayersTech was founded to bridge the gap between advanced research and industrial manufacturing.

Our technology platform is based on years of research within organic photovoltaics and functional thin-film materials carried out at SDU CAPE. This work has generated a portfolio of patented technologies focused on improving charge transport, interface engineering and scalable manufacturing processes.

By combining scientific expertise with an industrial mindset, LayersTech transforms research results into practical solutions that address the real challenges faced by organic solar cell manufacturers.

Our objective is not simply to develop better materials, but to enable more reliable production.

Supporting Long-Term Success

Qualification does not end when production begins.

As manufacturing evolves, LayersTech works closely with customers to support continuous process optimization, evaluate new product generations and identify opportunities for further improvements in manufacturing performance.

Our ambition is to become a long-term technology partner rather than simply a material supplier.

Let's Start the Conversation

The future of photovoltaics is not only defined by efficiency. It is equally defined by where solar energy can be integrated.

ColorFoil enables manufacturers to develop photovoltaic products that combine energy generation with aesthetics, opening entirely new opportunities within architecture, product design and integrated energy solutions.

Whether your objective is to develop the next generation of building-integrated photovoltaics or create completely new solar-powered products, LayersTech is ready to support your journey from concept to industrial production.

How We Can Support You

We invite you to discuss your application, manufacturing process and product vision.

Typical starting points include:

- Color evaluation
- Optical design discussion
- Sample evaluation
- Pilot production
- Joint product development
- Customer-specific color development

Get in Touch

Whether you are developing the next generation of architectural photovoltaics or exploring entirely new product concepts, we would be pleased to discuss how ColorFoil can support your innovation.

Contact us to:

- Request ColorFoil samples
- Discuss your application
- Schedule a technical meeting
- Explore development partnerships