

# Preparation and Applications of UV Curable Multicolor Dry Films

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## Abstract

The paper briefly describes the preparation and applications of UV curable multicolor dry films. The UV curable formulation containing pigments is firstly coated on the PET film, and then thermally transferred to a rigid flat, followed by exposure and development to form different tinctorial images, identifier, and so on.

## Introduction

It has thousand years that ink can be used to form character or picture by different printing methods. The dryness of ink has been developed from gas drying, heat curing to UV curing. The photosensitive material containing pigments is precoated onto the transparent polyester film, and then the photosensitive film which has the function of coloring is transferred to the rigid flat by heat transfer method. Finally, character is formed with different colors, pictures and marks by sensitization and development. So, it can be applied to advertisement, directing-brand, caution-brand, road sign and so on. This new type multicolor photosensitive film has been attached much importance by the advertising, public security, architecture and academia.

## 1. The composition of heat transfer photosensitive film

The heat transfer photosensitive film is different from the common pressure-sensitive adhesive. The great number of pressure-sensitive adhesive tape is a kind of single componential copolymer of acrylic acid. The molecular structure of its basic resin is designed to macromolecule by the chemist, so it has adequate adhesive strength. The chemists mainly take into account the properties of its peel-off resistance, sheer-stress and cohesion resistance. More basically, the pressure-sensitive adhesive is a kind of transparent film without photosensitization.

Multicolor photosensitive film is a color imaging material with excellent photosensitization, and it has feeble viscosity to some extent. Its structure can be divided into three layers, as shown in Fig. 1.

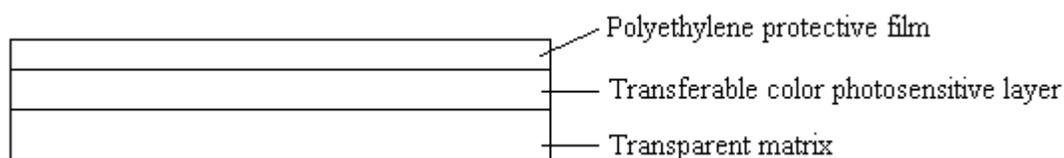


Fig. 1. The structure of multicolor photosensitive film

Transparent matrix (polyester film);

Photosensitive layer, which is composed of acrylic acid resin, photopolymerization resin, monomer, pigment, photoinitiator, additive and so on;

Protective film (transparent polyethylene (PE) film).

## 2. The composition of multicolor photosensitive layer

The multicolor photosensitive layer is different from common pressure-sensitive adhesive. It should be a kind of solid which can not flow and has slight viscosity at room temperature. Meanwhile, it has stickiness to transparent matrix to some extent, and can not be peeled off at room temperature. However, it has stickiness to protective film and can be peeled off easily.

Its components are as follows.

Matrix resin (acrylic acid resin, phenol-formaldehyde resin with carboxyl);

Photosensitive oligomer (macromolecular acrylic acid, ethylene ether, etc.);

Photoinitiator (arone and thioether compound);

Colorant (transparent pigment);

Leveling agent and heat transfer additive.

Matrix resin endows photosensitive layer with the properties of transferability, weak base water development and others;

Photosensitive oligomer can improve the sensitivity of photosensitive layer and the wear resistance of its postcuring;

Photoinitiator can promote UV solicitation;

Pigment affords hue;

Additive improves the microcosmic properties.

## 3. The imaging of multicolor dry-film

The imaging of multicolor dry-film can be divided into the following steps:

Preparation of printing sheet → separation of protective film (Fig. 2) → heat transfer photosensitive film (Fig. 3) → mask exposure (Fig. 4) → weak base water development (Fig. 5) → cleaning and post-exposure.

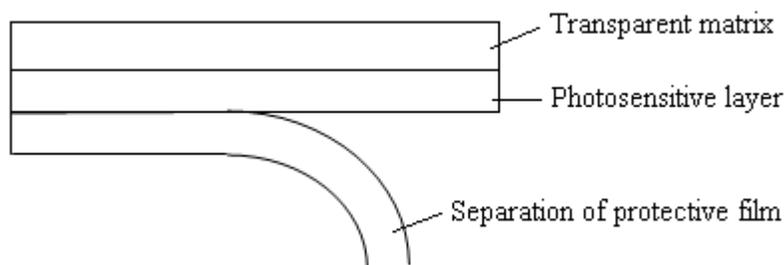


Fig. 2. The separation of protective film

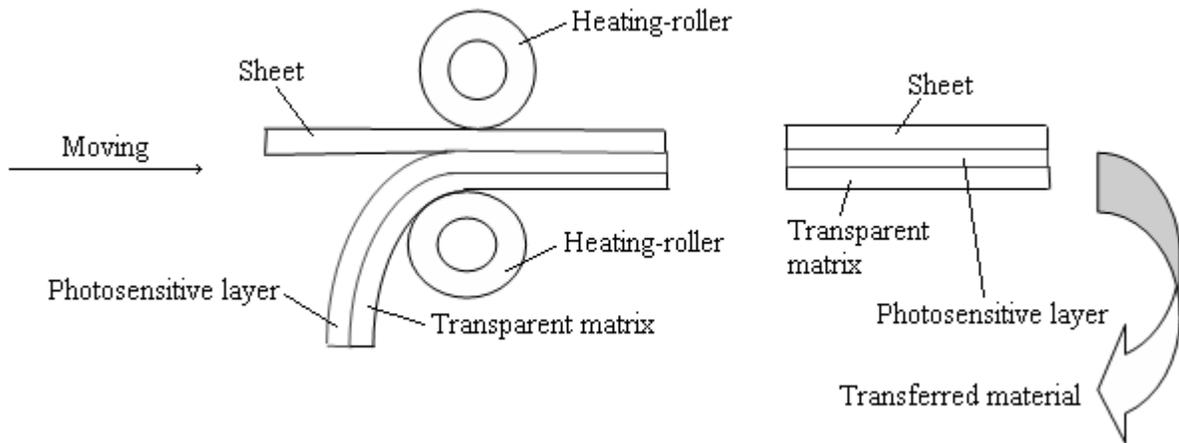


Fig. 3. The techniques of heat transfer photosensitive film

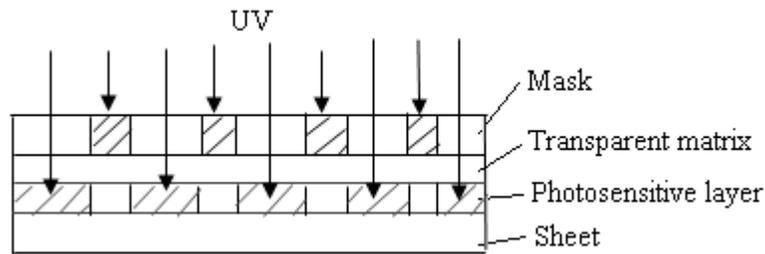


Fig. 4. The sensitization of heat transfer film

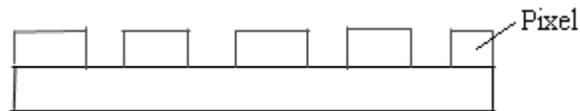


Fig. 5. The imaging of weak base water development

#### 4. The application of multicolor dry-film

The multicolor dry-film has the properties of bright hue, precision imaging, thermal and climate resistance, anti-rot and so forth. It can be applied to the fields of micromide interior advertisement design, mark, bulletin, etc. And it is specially adapt to the preparation of small batch interior advertisement and caution mark. So, it has wide foreground for application.

#### 5. Reference

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