# Photosensitive ITO solution (for transparent electrodes of PDP)

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## 1. Introduction

The large wall-type plasma display panels (PDP) are drawing people's attention. Their price is still very high for the consumers market, and every effort must be made on the part of the manufacturers including the improvement of the production process and the development of new materials that will help lower the price.

One way to achieve this goal is lowering the cost of the transparent electrode, one of the components that make up the panel. This electrode is mainly fabricated by photo-etching of indium tin oxide (ITO) film. This fabrication method requires expensive vacuum equipment and many processes that push the cost of PDP upward. One alternative is to use a photosensitive ITO solution that does not require expensive equipment. In this method, the transparent electrode is made by patterning by coating of the photosensitive, conductive solution, drying, UV exposure, developing, and baking.

The photosensitive ITO solution, developed by our company, is ideal for this alternative method as it gives ITO film of high transmittance and low surface resistance.

## 2. Photosensitive ITO Solution

Our photosensitive ITO solution can be used to make ITO film by patterning in a series of simple processes from coating to drying, UV exposure, developing, and baking. It has the following unique features:

1) It does not require the complicated photo-etching process and thus allows film patterning at low costs and by a fewer processes.
2) Film of low resistance can be fabricated by baking in atmosphere.
3) The high transmittance ensures high transparency.

## 3. Physical Properties of Photosensitive ITO Solution

Solid content (ITO conversion) 31.0wt% (10.0wt%)
Main solvents : 3-methoxybutyl acetate, propylene glycol monomethyl ether acetate
Viscosity : 13 ~ 15cP
Specific gravity : 1.18 ~ 1.19

## 4. Process Conditions

Substrate : Soda lime glass
Coating : Roll coat (natural coat)
Drying : 120℃ for 12 minutes (direct hot plate)
Exposure : 252mJ/cm$^2$ (i-radiation)
Developing : Ethanol solution with 5wt% acetate (paddle : 2min)
Washing : Ethanol (paddle : 10sec)
Baking : 580℃ for 1hr in atmosphere (temperature rise speed 10℃/min)

## 5. Film Properties

Thickness : 200nm
Surface resistance : 680Ω/□
Specific resistance : $1.36 \times 10^{-2}$ Ω・cm
Transmittance (550m) : 98.2%
Haze : 0%
Strength : 6H (pencil hardness)
Patternability : Line width 5μm (Figure 1)

## 6. Characteristics of Roll Coated Film

Figures 2, 3, and 4 show the characteristics of film fabricated by roll coating.

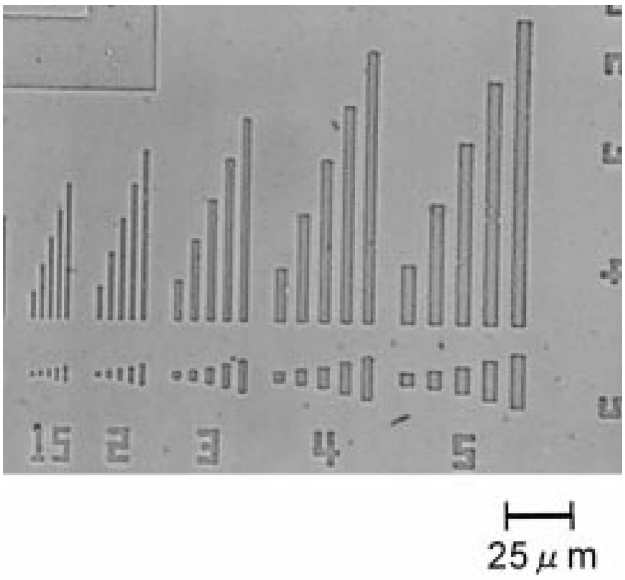


Fig. 1 Micro-patterned ITO thin film

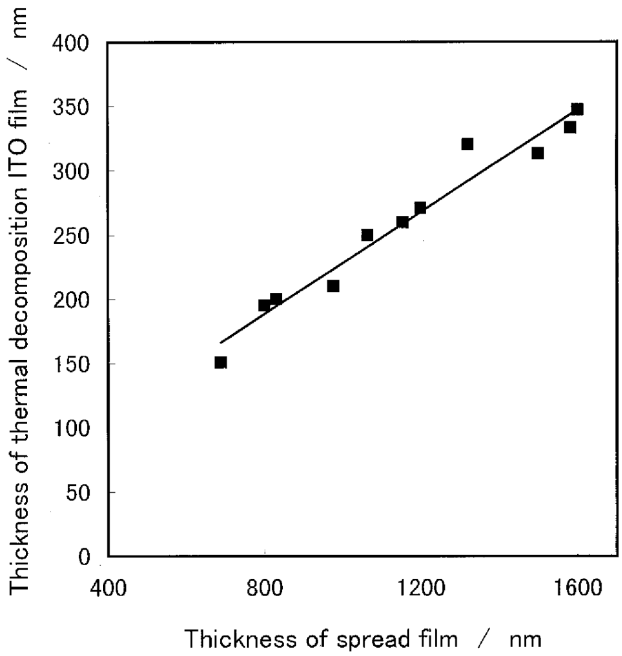


Fig. 2 Coated film thickness vs. baked film thickness

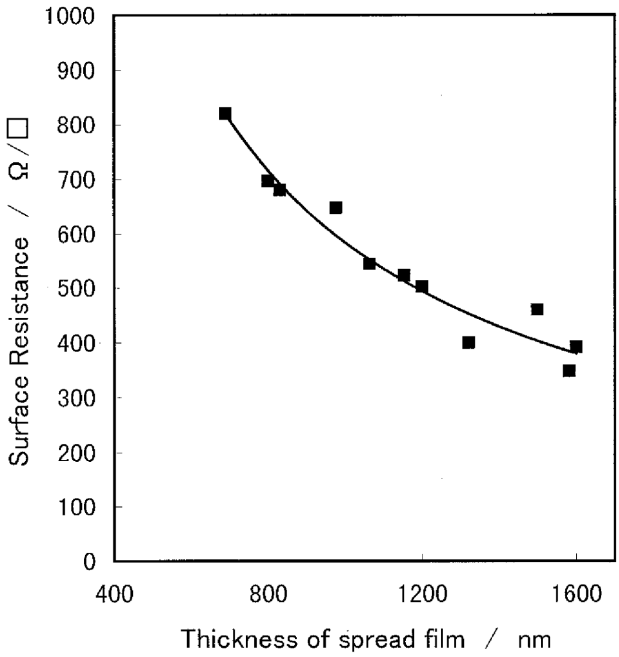


Fig. 3 Coated film thickness vs. surface resistance

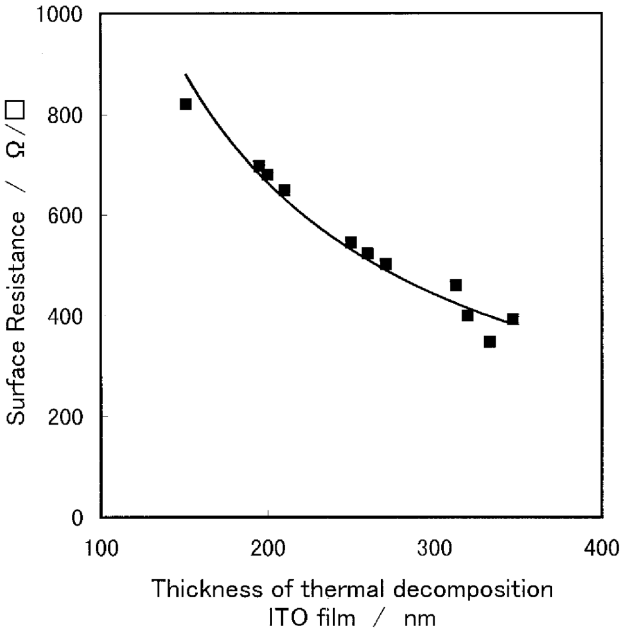


Fig. 4 Baked film thickness vs. surface resistance