Effect on the textile coating and laminating products by plasma treatments

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1. Introduction

"Plasma" is a partially ionized gas containing ions, electrons and neutral species and so-called fourth state of materials, which can be achieved by different kinds of energy input. plasma thchnology is a method for versatile material surfaces treatment. Typical processes such as activation, cleaning, grafting, function and deposition are applied in many areas of industial production for both batch and/or continuous processes.

As one of the plasma technologies, interests using an atmospheric pressure have been rapidly grown in last several years at electronics industry for the production of Flat Panel Display

In particular the use of atmospheric pressure plasma is interesting for textile materials due to the steadily rising demand for environment friendly and resource saving method for surface treatment and the running at the room temperature. Besides them, it has another advantages like cost-down for the production and no need of the vacuum chamber.

2. Experimental

In close cooperation with Jesagi Hankook, a korean leading company of plasma machines, we have built a roll to roll type continuous machine which can be attached with automatic controlled speed(0~20 m/min), power controller up to 1000W, working width up to 60cm and gap controller between plasma and substrate, which can be easily integrated into existing production lines.(Fig. 1.)

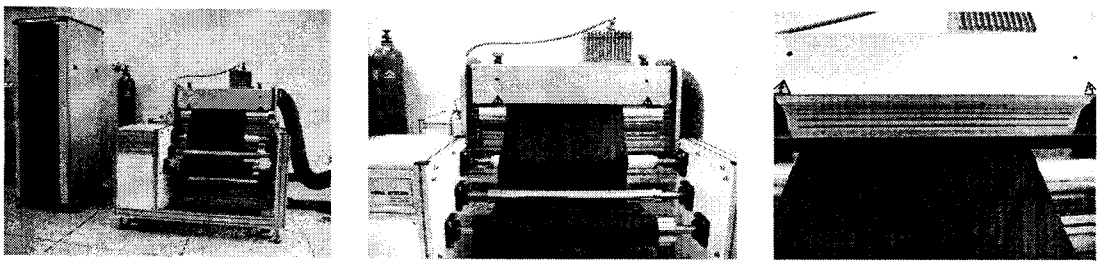

Fig. 1. DBD structure and roll to roll continuous equipment

3. Result and Discussion

3.1 Plasma treatment of coating and laminating fabrics

To improve the peeling strength, it was treated with various conditions. Figure 2. shows plasma effect between resin and substrate. The barrier discharge treatment of coating fabrics increases the peeling strength according to the power supply. The morphology of coating clearly shows the tight adhesion of the resin to the substrate.

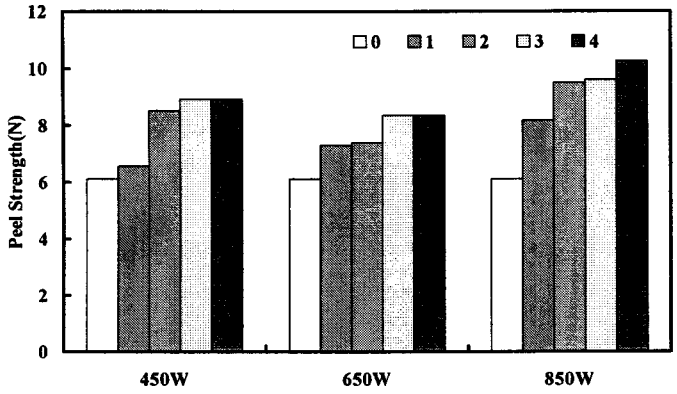

Fig. 2. Results of the peeling strength by plasma treatment

The investigation of surface topography of TPU film shows structure variaton after treatment compared with untreated.(Fig. 3.) This gives more roughness on the surface and give rise to the tight adhesion.

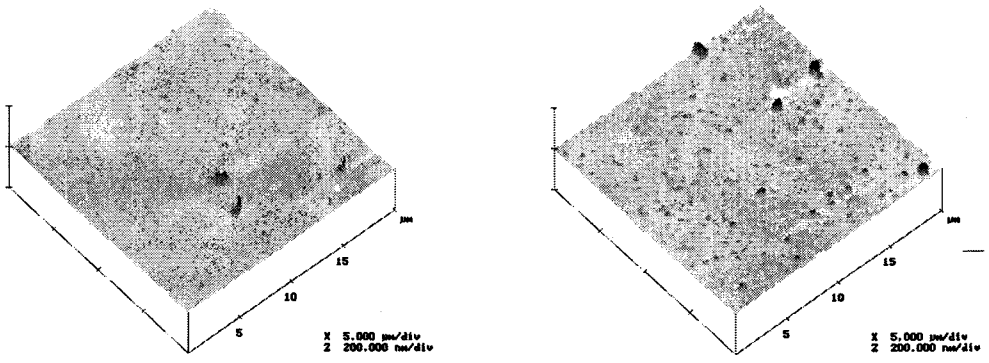

Fig. 3. AFM pictures of TPU film(20㎛)right; untreated, left, treated

3.2 Hydrophilic Functionality of water repellent fabrics

The plams treatment of water repellent fabrics decrease the contact angle of water from 130° to 100°. This effect is sustained after on week.(Fig. 4.)

The water repellent finishing by traditional wet-process is treated both front and back side of fabrics. Possibility is observed to give the different functionality on the both sides.

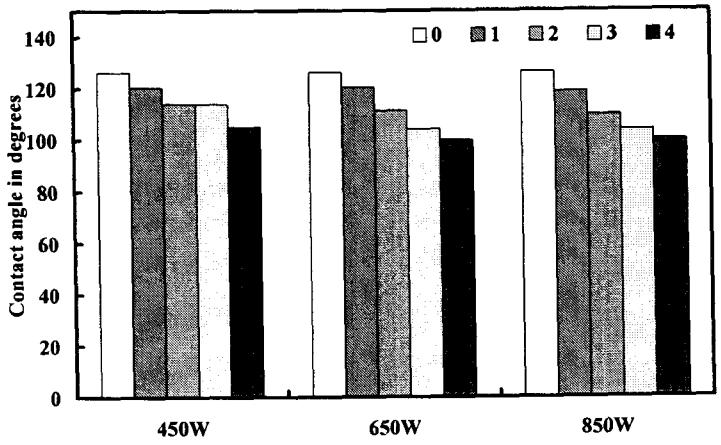

Fig. 4. Results of the hydrophilic property by plasma treatment

4. Conclusions

Plasma based modifications are dry processes and it can be an interesing economical altermative to traditional wet textile finishing systems.

It is to be expected that the plasma treatment brings additional advantage, in particular removing oiling contamenation of spandex products in the field of pre-treatment and enhanced color depth in the field of dyeing and functional finishing for the technical textile markets that will grow.

References

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