

## **Effects of Ar and N<sub>2</sub> mixture gas plasma on the surface properties of polyethylene naphthalate**

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The polymer substances such as polyethylene naphthalate (PEN), polyethylene terephthalate (PET), and poly carbonate have been considered as flexible substrate in various display technologies. The important reasons are that they offer high optical transmission in the visible range, good resistance to corrosion, and relatively inexpensive to produce. But, to the application for flexible display, polymer substrates require surface treatment prior to coating processes because plastic substrates have weak adhesion due to low surface energy. Many research groups studied on surface properties of PET treated by plasma, but reports on the characteristics of the plasma-activated surfaces of PEN substrates are relatively rare.

Hence, in this study, effects of Ar and N<sub>2</sub> mixture gas plasma on the surface characteristics of PEN have been investigated. The surface roughness, surface energy, and surface chemical bonding states of PEN treated by inductively coupled plasma have been characterized by atomic force microscopy, contact angle measurements, and X-ray photoelectron spectroscopy. The experimental results reveal that plasma treatment induces physical and chemical changes of PEN surface, showing the increases of surface roughness and surface energy. In particular, the changes of surface binding energy, due to the plasma treatment, may be attributed the creation of C=O and C-O functional groups which are associated with high value-dipole moment binding energy states.