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SURFACE STUDIES OF PLASMA SOURCE ION-IMPLANTED POLYSTYRENES

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Polystyrene is a linear polymer and is a thermoplastic with many desirable properties. It is clear, transparent, easily colored, and easily fabricated. The major application field for polystyrene is packaging and insulating materials. It is a very attractive work modifying polystyrenes in order to get the fittable surface to a technological goal, for example adhesive properties, bio-compatibility and printability, without altering the bulk properties of polystyrene.

Plasma Source Ion Implantation (PSII) technique was used for the treatments of polystyrene. Polystyrenes were modified with different gas plasmas and for varying lengths of implantation time. A study of plasma source ion-implanted polystyrene were performed using contact angle measurements, Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS), and Electron Spectroscopy for Chemical Analysis (ESCA). Static TOF-SIMS, whose sampling depth is comparable with that of contact angle measurement, revealed a modification of the polystyrene surface.

Hydrophobic recovery of PSII treated polystyrene were also observed with regard to its dependence on time, ageing temperature, molecular weight and treatment parameters. Treatment parameters involve kinds of gases, pressure, radio frequency, pulse voltage, etc. To study the effect of molecular weight on hydrophobic recovery, a wide range of molecular weight polystyrene films were prepared and characterized by contact angle goniometer and TOF-SIMS.

In this presentation, the purpose is to provide experimental data and to discuss the relationship between the contact angles and the chemical compositions of PSII modified polystyrene surfaces. This work could then set a better basis for understanding the PSII surface modification mechanism and the hydrophobic recovery behaviour.