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Hydrophobic property improvement of PET and LLDPE film by PSII

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The plasma source ion implantation (PSII) is one of many surface modification techniques. We investigated hydrophobic properties for LLDPE and PET films treated by PSII in the range of few keV energy. PET and LLDPE polymers are widely used in the industrial application as fiber, film, beverage-bottle, vessels, pipe, and so on.

The surface energies were calculated from the water and diiodomethane contact angles of the polymers treated with plasma and PSII method. XPS and AFM were used to characterize the modified surfaces of PET and LLDPE films. The hydrophobic properties of polymer films were greatly enhanced after a CF_4 -PSII treatment as evidenced by an increased contact angle. In XPS study, CF, CF_2 , and CF_3 atomic concentrations are increased after CF_4 -PSII treatment. Hydrophobic properties of the modified polymer surfaces are related to the fluorine-containing functional groups, especially CF_2 and CF_3 groups. As comparison with LLDPE and PET, CF_4 -PSII treatment provides more hydrophobic properties on the LLDPE surface than PET surface.