

Mechanical and structural properties of PC/ABS treated with Ar ion using hybrid ion beam system

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The polycarbonate and acrylonitrile butadiene styrene (PC/ABS) surface have modified by argon ion beam treatment using hybrid ion beam system. All the PC/ABS samples were treated using a 1 KV anode voltage with different time ranged from 5-50 min. Ar gas ion was introduced into the ion gun to obtain Ar ion. The distance between the ion source and substrate holder was about 15 cm. A radio frequency bias voltage (-600 V) was applied to the substrate holder.

Scratch tests were performed on Ar ion beam treated PC and PC/ABS substrates using a diamond tip with a varying load. A stylus profilometer was employed to determine the scratch profiles, while the scratch widths were also measured by optical microscopy. Tribological behavior was characterized using wear test of the Ar ion beam treated PC/ABS surface with a ball-on-disk tribometer using polyethylene (PE) ball as a counter face material, resulted that friction coefficient decreases as increases the exposure time of ion beam. For the measurement of mechanical properties of the ion beam treated surfaces, nano-indentation experiment were performed which shows that hardness as well as the elastic modulus of the PC and PC/ABS surface decreases with increase of Ar ion beam treatment. The decreases of hardness of PC/ABS have been explained in terms of surface morphology changes induced by Ar ion beam treatment.