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Separated effects of ion and UV photon interactions on polypropylene[1] CARLES CORBELLA ROCA[2], MAIK BUDDE, SIMON GROSSE-KREUL, Ruhr-University Bochum, TERESA DE LOS ARCOS, GUIDO GRUNDMEIER, Paderborn University, ACHIM VON KEUDELL, Ruhr-University Bochum — Plasma treatment of polymers is an important technology for the packaging, biomedical, or automotive industry, because it determines the interface of a subsequent coating on that polymer. To understand the effect of plasma treatment on the polymer, the influence of ions, radicals, electrons and of plasma-generated UV photons needs to be addressed separately since the penetration depths of these species are very different. This is analyzed using a particle beam experiment for the case of polypropylene (PP). In previous experiments, the combined impact of ions and UV photons has been studied. Here, an ion beam deflector is used to steer the argon ions on the sample, but to block the UV photons from the plasma source. The modification of the PP surface by argon ions only is monitored by in situ Fourier transform infrared spectroscopy (FTIR). One observes a transition from an initial phase of high etching rate to a steady state phase without chemical modification and lower etching rate. This behavior is attributed to the progressive graphitization at the surface due to ion bombardment. An anti-synergism is observed due to the cross-linking of the polymer by incident UV photons beyond the penetration depth of the incident ions.

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