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Silicon oxide permeation barrier coating of PET bottles and foils using a biased microwave plasma SIMON STEVES, MICHAEL DEILMANN, NIKITA BIBINOV, PETER AWAKOWICZ, Ruhr-University Bochum, Institute for Plasma Technology, Germany — There is a growing demand for bottles made of polyethylene terephthalate (PET) on the global market. However, PET offers poor barrier properties against gas permeation and the shelf live of packaged food is reduced. A permeation barrier coating of PET bottles and foils is developed by means of a microwave driven low pressure plasma reactor based on a modified Plasmaline antenna. Barrier performance is enhanced by depositing a transparent plasma polymerized silicon oxide (SiO_x) coating on the inner surface of the PET bottle. To improve SiO_x-barrier coatings the ion energy is modified using a substrate bias. The influence of ion energy on the characteristics of plasma and coating is investigated. Ion energy distribution (IDF) is determined using a plasma monitor and a retarding field analyzer. The composition of the coatings is analyzed by means of Fourier transform infrared (FTIR) spectroscopy regarding carbon and hydrogen content. A strong relation between barrier properties and film composition is found: good oxygen and carbon dioxide barriers are observed as carbon and hydrogen content in the coating is reduced.

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