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2.45 GHz Microwave Plasma Source SLAN I-DS

Fig. 1: SLAN I-DS

Surface modification of fluoropolymers by microwave plasmas: FTIR investigations

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The work described below was performed using a PlasmaConsult SLAN-I-DS microwave plasma source.

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Surface modification of fluoropolymers by microwave plasmas: FTIR investigations

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Abstract

Fluoropolymers have unique properties, which are desired in many applications. e.g. high thermal stability, chemical inertness, low surface tension and low dielectric constants. For some engineering aspects their poor adhesion to other materials is a disadvantage. One possibility to improve adhesion is the surface modification by plasmas. In this work the microwave plasma treatment of a copolymer of tetrafluoroethylene and perfluoroalkoxyvinyl ether (PFA) was investigated.
In a slot antenna 2.45 GHz microwave plasma source (SLAN) the plasmas of oxygen, nitrogen, argon and their mixtures are generated. Changes in the ATR-infrared spectra of PFA after different plasma treatments are studied. The ATR-infrared spectra of the plasma modified PFA show a new absorption peak at 1884 cm^{-1}, which is related to the acid fluoride end group −(C=O)-F. This peak is observed for each plasma treatment, but a pure oxygen plasma yields a maximum peak. Different formation mechanisms of the acid fluoride group are discussed.
An argon plasma treatment results in a highly branched and crosslinked structure located in a thin surface layer. The addition of 10% oxygen or nitrogen to the argon reduces blanching and crosslinking. Pure oxygen plasma treatment causes no crosslinking.

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APPLICATION NOTE

SLAN I-DS