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Quantitative measurement of VUV radiation related to polymer pre-treatment in a microwave driven low pressure plasma[1] FELIX MITSCHKER, ENRIQUE IGLESIAS, MARCEL FIEBRANDT, NIKITA BIBINOV, PETER AWAKOWICZ, Ruhr-University Bochum, INSTITUTE FOR ELECTRICAL ENGINEERING AND PLASMA TECHNOLOGY TEAM — Plasma pretreatment of polymers is used for a wide range of applications, e.g. prior to deposition of thin SiO_x barrier films. At this, plasma generated particles and vacuum ultraviolet (VUV) radiation can reach the polymer surface. Both have a severe impact on the polymer interface, resulting in the production of e.g. dangling bonds. These modifications govern subsequent thin film growth. For understanding of pretreatment processes, VUV radiation has to be quantified. Absolute VUV photon fluences are determined in situ, at the substrate holder, applying sodium salicylate (NaSal) as a scintillator. Therefore, VUV photons are quantified from 50 nm to 325 nm, due to constant quantum efficiency of NaSal, as integrals over defined wavelength ranges (50-110, 110-170, 170-200 and 200-325 nm). The set up allows for measurement with three scintillators. Each is equipped with optical filters. Observation of the fluorescence band is performed by means of optical fibers and a photomultiplier. Quantification is achieved by simultaneous measurement with an absolutely calibrated echelle spectrometer in the spectral range from 200 nm to 325 nm, taking into account observed plasma volumes. VUV photons are quantified for argon and oxygen plasmas as well as mixtures of both.

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Felix Mitschker
Ruhr-University Bochum

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