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**Deposition of Zinc Oxide as UV Protection Coating by MW-PECVD**Stefan Merli<sup>1</sup>, Andreas Schulz<sup>1</sup>, Matthias Walker<sup>1</sup>, Rafael Oser<sup>2</sup>, Ulrich Stroth<sup>1</sup><sup>1</sup>Institute for Plasma Research, Stuttgart, Germany <sup>2</sup>Bayer MaterialScience Aktiengesellschaft, Leverkusen, Germany

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Zinc oxide (ZnO) has attracted great attention in numerous applications due to its versatile physical properties. As a transparent conductive oxide (TCO) it is already employed as transparent electrodes in solar cells, light emitting diodes and other optoelectronic applications. Due to its high band gap of 3.2 - 3.4 eV, ZnO can also be used as a transparent protection coating against UV radiation for many UV-sensitive materials like polymers.

In this work a microwave plasma-enhanced chemical vapor deposition process (MW-PECVD) of ZnO films at low pressure is investigated. A mixture of diethylzinc (DEZ) and oxygen is used as source gas for the film deposition. The plasma is generated via the Duo-Plasmaline principle and is powered by two magnetrons with up to 3 kW in the cw mode at 2.45 GHz. The deposition rates are ranging from 200 to 600 nm/min. Fused silica plates are used as substrates. The optical properties like transmission and reflection of the ZnO films were investigated by means of photo-spectrometry ranging from 190 to 3200 nm. The deposited films had a high transparency of about 90 % in the visible spectral region and a high absorption in the UV region with an optical density of up to 3.5 at 340 nm, depending on the oxygen/DEZ mixing ratio. The absorption edge is ranging from 300 to 380 nm and shows a clear dependence on the mixing ratio. Therefore, the deposited ZnO films are well suitable as UV protection for materials which are sensitive to radiation with  $\lambda < 380$  nm. In this contribution, the deposition process as well as the optical properties of the ZnO films are presented regarding the deposition parameters.

**Keywords**

MW-PECVD

Zinc Oxide

TCO

UV Protection