Flexible polyvinylchloride (PVC) is used in a wide range of applications due to its very attractive price-performance ratio. The plasticizers used, typically phthalates, show, however, a marked tendency to migrate from the PVC matrix into the surrounding. In order to preserve its flexibility and good processability, but also to protect the environment, plasticizer leaching should be prevented [1]. Conventionally applied solutions to achieve this include e.g. lacquering with typical film thicknesses of around 10 µm or surface crosslinking of PVC by UV irradiation, but these methods are usually connected to high material cost, handling of relatively large volumes of chemicals, difficulties in the further processing of the PVC, and often do not provide a satisfactory barrier effect.

This paper presents a new approach to reduce plasticizer leaching based on PACVD coatings produced using a dielectric barrier discharge (DBD) at atmospheric pressure. In the experiments carried out so far promising results were obtained with siloxane coatings. For instance, with 100 up to 500 nm thick coatings on PVC foil deposited using the precursors octamethylcyclotetrasiloxane (OMCTSO) or hexamethylcyclotrisiloxane (HMCTSO) in air, migration according to the DIN EN ISO 177 was significantly reduced. Using atomic force microscopy (AFM) and scanning electron microscopy (SEM) it was found that no detectable pin-holes are present in the film if plasma parameters are properly selected. Evaluation of the influence and optimization of various plasma parameters including plasma power, pretreatment, treatment time, precursor type and concentration, have been attempted with the help of statistical methods (DoE). The above mentioned DIN EN ISO 177 test to determine migration is based on gravimetric measurements over a period of 30 days. As a part of this work a quicker method has been developed which is based on the extraction of the plasticizer from the PVC using a suitable solvent and subsequent analysis of the solution by infrared spectroscopy (IR). This method allows an evaluation of the barrier properties of the coatings within a few hours.


**Keywords**

Plasticizer leaching
Barrier film
Atmospheric Pressure Plasma