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Coatings deposited on powder by atmospheric PECVDElena Abadjieva¹, Yves Creyghton², Antoine van der Heijden²¹TNO Defence, Safety and Security, Rijswijk, Netherlands ²TNO Defence, Security and Safety, Rijswijk, Netherlands

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Recently the interest in powder coating techniques has increased due to the novel applications in cosmetics, pharmaceuticals, agriculture, materials engineering, pyrotechnics and energy storage. Atmospheric pressure PECVD coupled with fluidized bed has received attention as an economically beneficial technique capable of processing large amounts of powders at relatively low costs. This paper contributes to the further evaluation of the atmospheric PECVD as deposition technique for powders, presenting information on the chemical nature of the produced thin coatings. Dielectric barrier discharge (DBD) in both filamentary and glow mode coupled with circulating fluidized bed has been applied to treat powders. The coatings have been produced using four different mixtures, e.g. HMDSO/Ar, HMDSO/N₂, C₃F₆/Ar, and C₃F₆/N₂. The precursors are added in gaseous state. The chemical composition and the morphology of the coatings are determined with Attenuated Total Reflection Infrared Spectroscopy (ATR-IR), X-ray Photoelectron Spectroscopy (XPS) and Scanning Electron Microscopy (SEM), respectively. The transition to hydrophobic surface state as well as the long term stability of the surface energies is examined with water contact angle measurements (WCA).

The plasma deposition process is optimized varying the input plasma power, the excitation frequency and the type and the amount of the precursor. The differences in the coating characteristics are reported.

Keywords

coating

PECVD

powder

fluidized bed

atmospheric pressure