Extended Abstract
Volume 9:2, 2021

Biodiversity & Endangered species

Open Access

Polyester powder coating of wood and wood composites with atmospheric pressure plasma jet (AAPJ)

Robert Köhler

HAWK University of Applied Sciences and Arts, E-mail: robert.koehler@hawk-hhg.de

Abstract

Introduction: Powder coating is a viable alternative to traditional coating procedures. This procedure is especially environmentally beneficial because it allows for the absolute exclusion of any additives containing volatile organic compounds or organic solvents. It also ignores the necessity for unique substrate characteristics like electrical conductivity. Electrical conductivity is especially significant in typical powder coating methods, because the powder clings to the substrate due to a difference in electric potential. A corona discharge is typically used to charge a powder, and the powder is sprayed onto a grounded substrate. . In case of wood and wood composites, the limited electrical conductivity constitutes a disadvantage. Pre-heating or priming process with an electrically conductive wet lacquer is frequently required to coat a nonconductive and porous substrate like the ones indicated above.

Materials & Methods: An APPJ was utilised to apply a polyester powder (Interpon 610 MZ013GF; D50 50 m) from Akzo Nobel Powder Coatings GmbH, Arnsberg, Germany) on wooden and wood-like substrates in this work. The powder material is made up of iso- and terephthalic acid, and it was deposited using the source's effluent plasma zone. European beech wood (Fagus sylvatica L.), Grand fir (Abies grandis lindl), and medium density fiberboard were used as coating substrates (MDF). The coating was annealed in an oven at 180°C for 10 minutes after the plasma process. To detect possible chemical degradation of the applied polyester during the plasma coating process, the coated samples were analysed using X-ray photoelectron spectroscopy (XPS) and Fourier-transform infrared spectroscopy (FTIR).

In addition, laser scanning microscopy was used to determine the layer thicknesses of the samples (LSM). Adhesive strength investigations were carried out using dolly test based on ASTM D 4541-02 and DIN EN ISO 4624:2016-08

Results: Due to the plasma technique, the applied powder material did not undergo any chemical changes, and the adhesive strength of the layers satisfied realistic criteria of >1 MPa. The atmospheric pressure plasma coating procedure for wood and wood-based goods shown here could be a viable alternative to conventional wood coating technologies.

Biography

Robert Köhler is pursuing his PhD at University in Göttingen. His thesis is concerned with “The weathering resistance and the catalytic degradation of VOC`s of plasma particle-modified wood and wood materials”. Currently, he is a research scientist at the project “PLaNaWood2- functionalization of wood and wood materials” with financial support from the German Federal Ministry of education and research. He has published one poster presentation and one
patent.

This work is partly presented at 5th International Conference on Plasma Chemistry and Plasma Processing, November 13-14, 2017 Paris, France