



#PLATH00136

DEPO / Plasma - deposited coatings for optical, electronical and other functionalities

How to allow adhesion of powder paint on insulating substrates?

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Abstract content

Powder paint is of great interest compared to liquid paint because it is environmentally friendly since no solvent is used and also affordable since just one layer is needed. However, the adhesion of this paint is based on electrostatic interactions with the substrate, which needs then to be conductive. So the objective of this work is to be able to apply powder paint onto insulating substrates, particularly polymer ones such as polycarbonate (PC) and polyamide-6 (PA6). In order to achieve this goal, we have deposited on these substrates a thin layer of a conductive polymer by plasma polymerization of different monomers (aniline, pyrrole, acetylene and thiophene). The plasma polymer is then doped by iodine vapours in order to create charge carriers. We have studied the adhesion and the homogeneity of the coat of paint according to the nature of the plasma polymer, its thickness, its doping duration and its chemical structure depending on plasma parameters. As an example of result, figure 1 presents the homogeneity and the adhesion of the coat of paint according to the nature of the plasma polymer. They are better when the conductive polymer used is pp-aniline which is directly linked to its higher doping efficiency (the layer is darker in colour after doping). It means that a greater amount of charge carriers is created allowing a higher electrical conductivity. It can be explained by the chemical structure of the plasma polymers studied using FTIR and UV-Visible spectroscopies.

Plasma polymer	pp-aniline	pp-pyrrole	pp-acetylene
Plasma polymer after doping (I ₂ , 1h)			
After painting			
Paint thickness	159±17 μm	125±22 μm	
Adhesion test			
Class of adhesion on PA6	0 or 1	0 or 1	5

Figure 1. Results of painting of PA6 substrates according to the nature of the plasma polymer