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Optimization of the photocomposition for dielectric activation before chemical metallization

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Abstract

Photo-selective activation of dielectric materials is widely used in the production technology of printed circuit boards additive method. Photoaddition technology is a complex multistage process. It is necessary to form catalytic active centers for further chemical metallization to obtain a given diagram pattern on the surface and in the holes of the printed circuit boards.

Researched photosensitive compositions for activation of dielectrics are complex multicomponent systems that include photopromotor (copper acetate), optical sensitizer (anthraquinone sulfonic acid sodium salts), secondary reducing agent (sorbitol, ethyl alcohol, dichloride tin), component, preventing the process of hydrolysis of photopromotora and supports the value of the pH of the solution at a given level. The aim of the research was to optimize the composition of the photo composition by reducing the number of components.

Study of photoreductions copper(II) in a dry layer of the photo-activator under the influence of ultraviolet light requires a special approach. Optical characteristics of the photosensitive layer were selected as a criterion for assessing the depth of the copper(II) photo-recovery process. It is found that the transmission spectra of the photosensitive layer are more informative than the reflection spectra. The maximum transmission spectrum of the photosensitive layer is 520 nm. Its change in the process of ultraviolet irradiation makes it possible to judge the course of photochemical transformation in the dry layer of the photo composition. The reflection spectra of the photosensitive layer in the visible region of the spectrum do not have a maximum.

The methodology of study and evaluation of the occurrence of photochemical process on the surface of the dielectric material to optimize the composition of the photosensitive composition. Kinetic regularities of copper(II) photo-recovery in the solid phase are investigated. It is experimentally established that the structure of the prepared dielectric surface influences the optical characteristics of the irradiated dry photosensitive layer. As a model material was chosen chromatographic paper brand FN-5 to exclude the influence of this factor. It has the same sorption properties across the surface and allows you to fix a significant amount of photo composition. It does not require additional surface preparation prior to conducting a photochemical process.

A phenomenological description of the process is given in the form of kinetic equations explaining the process of photoactivation in relation to any photo-compositions and when using any dielectric materials. Fractional particular orders of the reaction on the components of the photo composition indicate the complexity of the process in the studied systems. Mathematical description of the kinetics of the photochemical process allows you to determine in advance the time when the desired degree of transformation of the substance will be achieved. It is found that the number of components of the composition must be reduced to increase the speed of the photoactivation process. This is possible due to the removal of its components with a negative reaction order.

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