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Urethane acrylate varnishes - influence of nanofillers on hardness and adhesion

Paulina Bednarczyk, Agnieszka Kowalczyk and **Zbigniew Czech**
West Pomeranian University of Technology Szczecin, Poland

The poster presents investigation of the varnishes with different nanofillers in order to improve the quality of photocurable coatings especially hardness and adhesion to glass substrate. All samples were cured under UV light, which significantly differ in dose of radiation, exposure time and intensity. It turned out that all of these parameters impact on hardness and adhesion of the photocurable varnish. Photocurable varnishes represent attractive intermediates for a broad variety of industry applications. It is considered to be the most effective way to rapidly transformation a solvent-free liquid resin into a solid polymer, at ambient temperature. The varnishes curable by ultraviolet (UV) are reactive compounds made by oligomers, monomers or reactive diluents, photoinitiators, and additives. The urethane acrylate oligomer was used as the film former, which binds all the ingredients into a continuous system, which forms a film after exposition by UV radiation. It usually formed films with low adhesion after curing in long time under low intensity and high adhesion after curing in short time under high intensity.The studies were conducted in hardness and adhesion of urethane acrylate varnishes using different nanofillers. The samples were cured in a long time under low-intensity lamp (UV-A lamp 1) and in a short time under a high intensity lamp (UV-A lamp 2). It turned out that the coatings cured under the lamp 1 characterized by a lower hardness but higher adhesion. While increase intensity and curing in a shorter time resulted in an increase in hardness and reduce the adhesion. In the case of curing the samples at the lamp 1 nanofillers increased hardness, while the sample with nanofillers cured under a high intensity lamp in a short time have a lower hardness than the samples without the nanofillers. Inversely proportional is adhesion of the coatings.

bednarczyk.pb@gmail.com

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