PhD thesis abstract

**New silicone pressure-sensitive adhesives – preparation and properties**

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The purpose of this work was to obtain new silicone pressure-sensitive adhesives by use of physical and chemical modifications selected commercial silicone resins and characteristics of the obtained self-adhesive products in terms of their adhesive, mechanical and thermal resistance properties.

and their characterization (measurement properties e.g. adhesion, cohesion, tack, shrinkage, thermal resistance, viscosity). Particular emphasis was placed on increasing the thermal resistance of new Si-PSAs. An additional aspect of the research was the development of a method for obtaining double-sided adhesive silicone adhesive tapes (dSi-PSA) from modified silicone resins, so far unavailable on the market of highly specialized self-adhesive materials.

From available silicone resins they are selected ten to chemically modified using 2,4-dichloro benzoyl peroxide and benzoyl peroxide, used as crosslinking agent. The influence of the type and amount of chemical modifier on the self-adhesive properties of the obtained Si-PSA (i.e. adhesion to various types of substrates, including low-energy ones such as Teflon®, stickiness, cohesion, polymer shrinkage) was determined. Selected Si-PSAs were also characterized in terms of resistance to aging and atmospheric conditions (climate tests) and flammability tests were performed. The possibility of storing finished compositions for commercial use was also tested..

Then, physical modifications of selected silicone resins were carried out by used dye and natural filler (dolomite) additives to confirm the basic properties of silicone pressure-sensitive. According to the assumptions, a decrease in adhesion, cohesion, shrinkage and tack of pressure-sensitive adhesive and an increase in the viscosity of stored compositions were noted. These research were made as a reference for this work.

Among the obtained self-adhesive compositions, four were selected, which were subjected to physical modification by the task of adding silicon filler on the properties of pressure-sensitive adhesives. Kaolin, montmorillonite and silica were used in the work. The addition of silicon-based modifiers caused an increase in the thermal resistance of adhesive films (SAFT test) – to 210°C, by maintaining the silicone-like values of pressure-sensitive adhesives, thanks to which high-quality self-adhesive materials for special applications were obtained.

In addition, a new method for obtaining double-sided adhesive tapes based on silicon pressure-sensitive adhesives was developed during research (currently there are no equivalents on the market or in the patent literature). Double-side self-adhesives tapes with two protective layers and dSi-PSA rolled up with one protective layer were developed. The prototype was prepared for a laboratory scale.

Szczecin 05.05.2020 r.