

POLYURETHANE ADHESIVES WITH ENHANCED ADHESION AND MECHANICAL PROPERTIES DUE TO THE ADDITION OF VERY SMALL AMOUNTS OF GRAPHENIC CARBON MATERIALS

(P) TECNOLOGIA PATENTADA

RESUM

Polyurethane adhesives are widely used in industry for bonding materials in the footwear, electronics, renewable energy, aeronautics, and construction industries, as well as in composite materials. However, they have limitations due to their mechanical properties and stiffness.

Researchers at the university have developed a process to add different graphenic carbon materials to polyurethane adhesives in a very small amount (less than 0.1% by weight). In this way an adhesive with improved thermal and mechanical properties (mainly toughness), and notably increased adhesion properties have been obtained.

The resulting adhesives have been tested for verifying their new properties. These properties are ideal for use in high performance applications, such as in the electronic components industry.

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AVANTATGES I ASPECTES INNOVADORS

- Significant improvement in the adhesion properties of the polyurethane adhesives.
- The resulting adhesive has excellent thermal, mechanical and conductivity properties, as well as improved toughness.
- Minimum amount of graphenic carbon material (less than 0.1% by weight) is needed. In the state of the art there are some examples of the addition of graphenic carbon materials to adhesives but in no case in such a low proportion.
- The addition of graphite oxide (GO), milled graphite (MG) or graphite or grapheme nanoplatelets (GNP) does not require the use of ultrasounds to disperse into the polyurethane adhesives.
- Non-functionalised graphenic carbon materials are used. Until now, most of the previous studies in polyurethanes require the functionalization of the graphenic carbon material.
- The viscosity and color of the polyurethane adhesive are not altered by the addition of graphenic carbon material (less than 0.1% by weight).

In industry there is a need to use polyurethane adhesives with improved adhesion properties that also impart toughness to the adhesive joints made with them.

Until now, the use of graphenic carbon material as an additive to polyurethane adhesives had not been studied in depth and their influence on their adhesion properties was unknown. The work developed by the researchers has allowed the development of a process to obtain different polyurethane adhesives with significant improvements in their adhesion and mechanical properties with the addition of a minimum quantity (less than 0.1% by weight) of graphenic carbon material. These improvements are related to the excellent dispersion of the graphenic carbon nanoparticles in the polyurethane matrix (Figure 1).

