New types of performance polymers used in ballistic protection

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Abstract: *The aim of the present study was the preparation of new types of polyurea polymers. The novelty of the work consists in the introduction of aromatic diamines as the third component besides the classical MDI (methylene diphenyl diisocyanate) and PPG (polypropylene glycol bis(2-aminopropyl ether), Mn=2000 g/mol) (Fig.1). This modification allows the synthesis of polymers with enhanced mechanical properties. As the third monomer benzidine, 4,4'-diaminodiphenylmethane and 3,6-diamino carbazole were chosen, and they were used in different ratios towards PPG, in order to optimize the polymer properties. The proportions between the polyurea components were selected as such to achieve the total consumption of the monomers. The different types of polyurea obtained have been characterized by FTIR, thermal and tensile strength measurements (Fig.2).*

The best mechanical properties for the ballistic protection applications were obtained using 4,4'-diaminodiphenylmethane as the third monomer. A tetraamino functionalized phthalocyanine (Fig.3) was introduced in a 1 % weight ratio for an increased performance of this material.

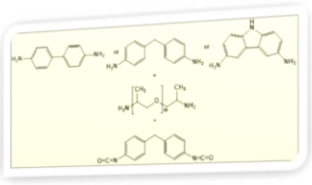

Figure 1

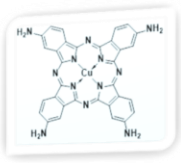

Figure 3

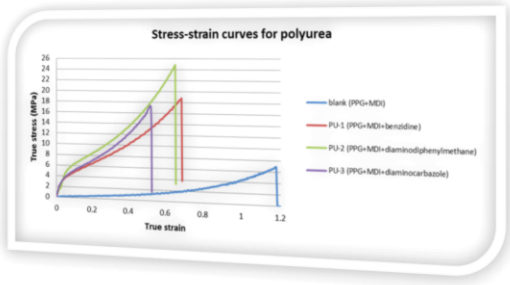

Figure 2

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