

Title: Treatment Method for Imparting Self-healing and Shape Memory Properties to Certain CBDO Copolyesters.

Background: This invention relates to amorphous copolyester copolymer compositions, as disclosed in U.S. Pat. No. 5,705,575, which inherently have a superior impact resistance. There is a need for such materials having an even greater impact resistance, and this invention is a treatment method for imparting superior impact resistance to said amorphous copolyester copolymers (hereinafter referred to as CBDO copolymers).

Invention Description: Discovered that the compositions made according to U.S. Pat. No. 5,705,575 will display self healing and shape memory properties when undergoing treatment, which involves heating the CBDO polymer to a temperature above its glass transition temperature. This discovery is unexpected since the CBDO polymer is an amorphous linear polymer with no crosslinks. The article by Behl et al. that reviews the current knowledge about shape memory polymers points out two main mechanisms that lead to shape memory. These include crosslinking and crystalline domains that act like crosslinks, neither of which exist in the CBDO polymer.

Benefits: A benefit of the cyclobutanediol copolyesters containing 1,3-propanediol or 1,4-butanediol monomers is relatively low color, as compared with ethylene glycol-containing cyclobutanediol copolyesters, which tend to test high on the yellowness index (ASTM D-1925) as measured on 1/8" disks. The copolymers preferably exhibit yellowness indexes less than about 50 or less than about 20. The copolyesters may have high molecular weights, typically reflected in an intrinsic viscosity of at least about 0.5 or about 0.6 to about 1.0. Copolyesters may have notched izod impacts of greater than about 2 or greater than about 3 ft-lb/in, and glass transition temperatures are 80 to 100.degreeC.

Market Potential/Applications: In addition to market potential of the original patent (U.S Pat No. 5,705,575), automotive parts, military applications, household goods, etc.

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