An investigation into the functional properties of Kevlar and Dyneema fabrics used as bulletproof

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Abstract:
Bulletproof fabrics are usually used as create jackets to protect the user from being shot. These jackets are varied write as according to the degree of expected risks and required levels of protection. Different types of materials and fibers could be used for achieving many properties and different levels of protections. The type and number of materials were affected on the required protection. The current market is looking to reduce the weight and thickness of these fabrics, in addition to low cost. In all bulletproof protective clothing, there is a certain basic material that contributes to stopping the bullet in a noticeable way. Currently, materials made of high molecular weight polyethylene (UHMWPE) and aramid fibers are widely used for this purpose. Aramid fibers are developed by upgrading ballistic nylon fibers while UHMWPE is developed from polyester. Kevlar 29 and Kevlar 149 are the dominant body armor material belonging to the aramid fibers. Dyneema is another UHMWPE. The molecular formula of this polymer is the same as common polyethylene but differs greatly due to its very high molecular weight, 10 to 100 times higher than that of commercial polyethylene resin.

This research paper goals to investigation into Kevlar and Dyneema fabrics to obtain the best functional properties of bulletproof fabrics. The samples were produced with a plain 1/1 structure. After the fabric samples were produced, tests were carried out to evaluate the samples produced such as, Tensile Strength, UV resistance, Heat Conductivity, Abrasion Resistance, washability, Chemical Resistance, Thermal Properties, the results revealed the superiority of Dyneema fabrics in terms of functional properties over Kevlar fabrics, as it has many properties that qualify it to be a bulletproof fabric.

Keywords:
Bulletproof fabrics, Dyneema fabrics, Kevlar fabrics

References: