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Graphene coated chitin plates based ballistic jacket guard using multi-stacking method

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Chitin is one of the most readily available forms of carbohydrate which is a complex form of glucose. This long chain polymer of N-acetylglucosamine is primarily found in the exoskeletons of arthropods, crustaceans and few other species. The chemical structure of chitin suggests that it can be compared to cellulose with its hydroxyl replaced with acetyl amine group. This allows the increased possibilities of hydrogen bonding between adjacent polymer molecules and this property forms the base on which the above mentioned development rests on. On close investigation of the most recent types of ballistic jackets in use, it was found that, in the anterior and posterior parts of the jacket that cover the trunk of the body, sheets of boron carbide have been employed in order to render the jackets such that they can block out the standard combat bullets upto 100 bullets with the impact trauma upto 13.5 mm. In comparison to the above, the above proposed development, Chitin, exclusively derived from Fish (*Labeo rohita*) scales and Lobster (*Nephropsis*) shells, was mixed with alpha-carbon graphene, in a base matrix of kevlar polymer. The inclusion of graphene improves the thermal resistivity of the chitin which contributes to the enhanced properties of the final product. Thereafter, sheets in the order of micrometers are drawn with this mixture and multiple such sheets are stacked together in order to obtain an optimum thickness. Finally, these multi-stacked sheets are then ready to be included into the ballistic jackets. The novelty of this development is that, due to the unique integration of chitin with other specialised components, the physical and mechanical characteristics of it is such that it can effortlessly block out standard combat bullets of a much greater amount and from as close as 8-9 m firing distance, hence proving it to be better in properties than the present ones in use.

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