
Light weight and high strength composite material fabricated using seashell tablets for ballistic applications

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Abstract

Seashells have been studied by numerous investigators and found to be stronger than any man-made material, when the weight and thickness are considered. A typical 1 mm thick seashell is composed of 2000 to 3000 'brick and mortar layers' and gives 1000 times higher toughness than a single block structure with the same material. There have been many efforts to mimic the 'brick and mortar' structure to make lightweight and high strength materials with potential application in military and space applications. Unfortunately, there have been to date no commercialized results. We prepared thin submillimeter seashell tablets and made a composite 'brick and mortar' structure. The specific gravity of the composite ranges from 1.7~2.1 depending on compositions. The seashell composite was used to make a hybrid ballistic insert with conventional ceramic ballistic material. The hybrid ballistic insert performed in a NIJ Level IV shooting test with full metal jacket rounds as well as the conventional ceramic insert. We plan to exploit the composite for different applications.

Keywords: ballistic insert, seashell, microplate, brick and mortar, specific gravity

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