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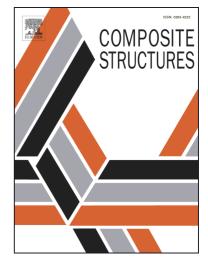
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## ACCEPTED MANUSCRIPT

# Effects of Tablet Waviness on the Mechanical Response of Architected Multilayered Materials: Modeling and Experiment

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#### Abstract

The excellent mechanical properties that biological materials possess are greatly influenced by the geometrical properties of their small scale constituents. Nacre, also known as Mother of Pearl, is an organic-inorganic composite material that makes up the inner layer of seashells. Nacre is observed for its impressive combination of stiffness, strength, and toughness which can be attributed to its waviness and the layering pattern of the brick and mortar structure of ceramic and protein that allows nacre to exhibit great mechanical energy and dissipate it over a large volume. In this study, the effect of this waviness on a model architected multilayered material system is analyzed numerically and experimentally in order to understand its effects on the stiffness, strength, and toughness of nacre. 3-D printed composites with auxetic and nacreous structure were created and tested in tensile boundary conditions. Finite element analysis was used to study the stress distribu-

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