

Abstract Submitted  
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**Nacre's strategy to enhance mechanical and fracture properties.**<sup>1</sup>

SINA ASKARINEJAD, NIMA RAHBAR, Worcester Polytechnic Institute — Enhanced mechanical and fracture properties of biological composites encourage researchers to focus on the problem-solving strategies of these naturally growing materials. Bone and nacre are prime examples of natural composites with high strength, stiffness and toughness. In addition to nano-scale features, nature has evolved complex and effective functionally graded interfaces. Particularly in nacre, organic-inorganic interface in which the proteins behave stiffer and stronger in proximity of minerals provide an impressive role in structural integrity and mechanical deformation of the natural composite. However, further research on the toughening mechanisms and the role of the interface properties is essential. In this study, a micromechanical analysis of the mechanical response of these composites is presented considering interface properties. The well-known shear-lag theory was employed on a simplified two-dimensional unit-cell of the multilayered composite. The results solve the important mysteries about nacre and emphasize on the role of organic-inorganic interface properties.

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