

Mechanical Properties of Organic/Inorganic Hybrid Nanolaminates

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Nacres, the mother of pearl, have layered nano-structures like bricks and mortar. The major component of nacres is CaCO_3 blocks with 200 ~ 900 nm in thickness, where a small quantity of organic layers with 10 ~ 40 nm is contained. It is known that its laminated structure achieves a lot of increase in yield-strength and fracture toughness over its constituent materials due to its sandwiched nanostructures. In present study, we prepared inorganic/organic hybrid nanolaminates using the layer-by-layer method. In the layered structures organosilicates blocks can consider as inorganic part, and polyelectrolyte layers as organic part. And we characterized the mechanical properties of hybrid nanolaminates with ellipsometry, field emission scanning electron microscope (FE-SEM) and depth sensing nanoindentation. The inorganic/organic hybrid nanolaminates have ordered internal structures and show increases in mechanical properties compared with the single inorganic layer. The increases is caused by the synergy effects of both inorganic and organic components.