The Effects of Carbon Nanotube (CNT) Network Interphase and Properties in Buckypaper Membrane on Fracture Toughness Using Atomic Force Microscopy

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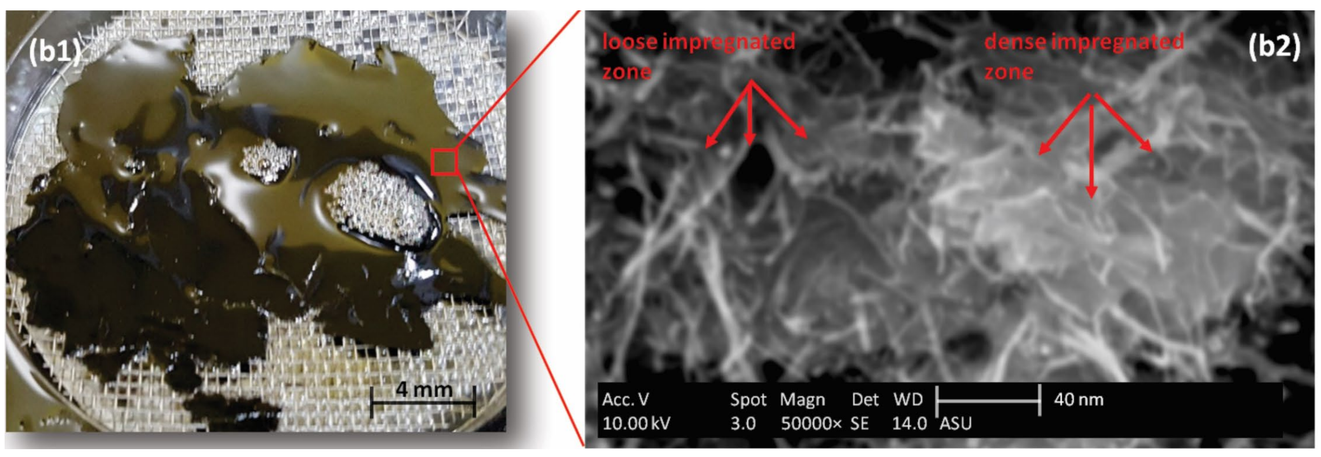
Abstract

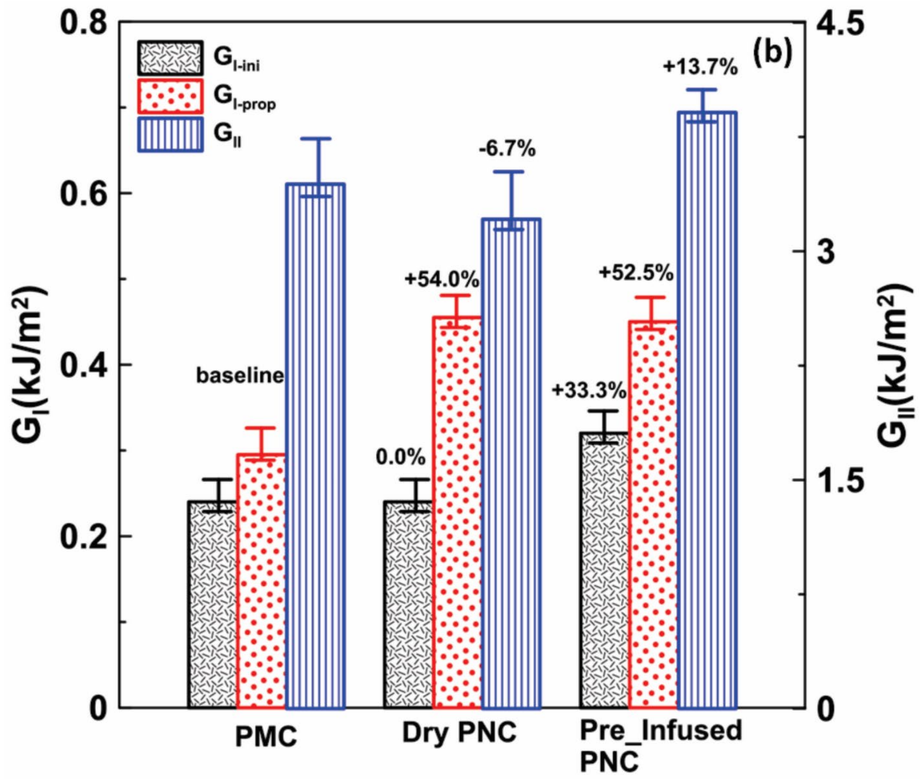
Understanding the CNT interphase is crucial in discovering potential uses for the multifunctional nanomaterial. Nanocomposites such as CNT are relatively new multifunctional materials that can be utilized in many promising fields, ranging from spaceships to supercapacitors. Atomic Force Microscopy (AFM) is used to characterize the effect of CNT network interphase in Buckypaper membrane on fracture toughness.

Scanning Electron Microscopy of Pre-infused Buckypaper



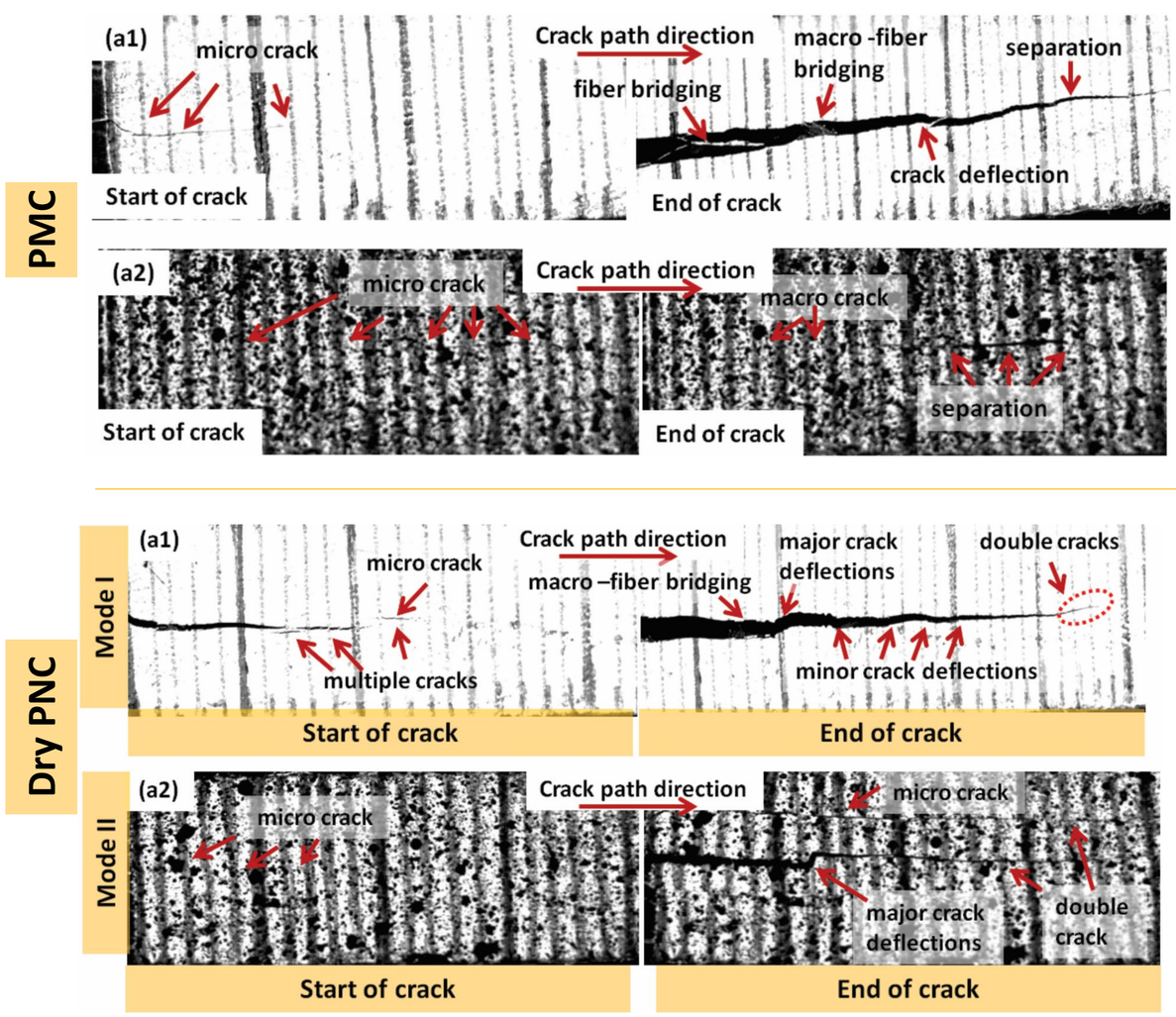
Pre-infused Buckypaper showing dense and loose impregnated zones and nanopores

Crack energy release rates for mode I and mode II



Crack energy release rates for Pre-infused PNCs are higher than the Dry PNC and PMC. The mode II crack energy release rate for Pre-infused PNC is 13.7% greater than the mode II crack energy release rate for PMC.

Observation of fracture crack growth



Multiple crack Deflections are present in both Dry and Pre-infused PNCs for both mode I and mode II fracture. Pre-infused PNCs display more major crack deflections compared to the Dry PNC.

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