

Strain sensing behavior and dynamic mechanical properties of carbon nanotubes/nanoclay reinforced wood polymer nanocomposite

The vibrational modes and the structure of Carbon Nanotubes (CNTs) are analyzed by Raman spectroscopy.



Material. MFFA prepolymer and 1,3-dimethylol 4,5 dihydroxyethylene urea (DMDHEU) for impregnation into wood in presence of MWCNT and nanoclay.

How MCWCNT is modified? A mixture of potassium hydroxide and ethanol was prepared and 5g of MWCNT was added to it. The reaction mixture was placed in an ultrasonic bath for 24 h at 80 C. The resulting mixture was filtered and repeatedly washed with deionized water until the pH value reached 7. Finally it was dried overnight in vacuum oven at 45°C. The product obtained was the MWCNT-OH.

Instrumentation. Micro-Raman Microscope made by WITec (USA) using 532 nm excitation laser with polarizer and the analyzer parallel to each other.

Conclusion. Strain dependent Raman spectroscopy showed efficient load transfer from the wood/polymer to the nanotubes indicating better interfacial interaction

Reference. Ankita Hazarika, Tarun K. Maji, *Strain sensing behavior and dynamic mechanical properties of carbon nanotubes/nanoclay reinforced wood polymer nanocomposite*, Department of Chemical Sciences, Tezpur University, 2014

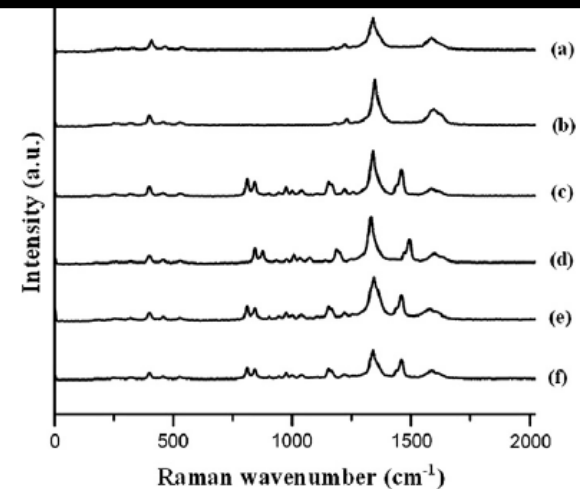


Fig. 3. Raman spectra of (a) unmodified MWCNT, (b) MWCNT-OH and wood treated with, (c) MFFA/DMDHEU/nanoclay/MWCNT (0.5 phr), (d) MFFA/DMDHEU/nanoclay/MWCNT (1.0 phr), (e) MFFA/DMDHEU/MWCNT (1.5 phr) and (f) MFFA/DMDHEU/nanoclay/MWCNT (1.5 phr).

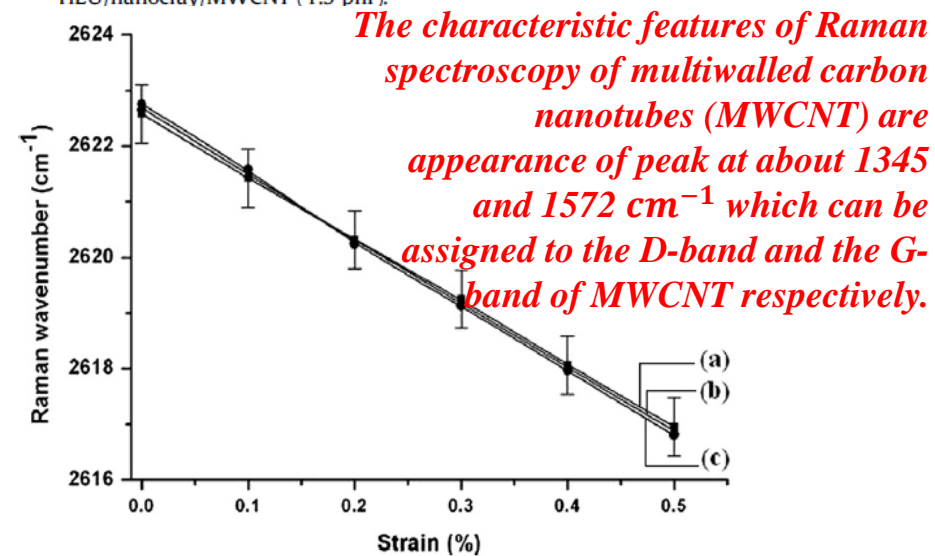


Fig. 4. G'-band shift as a function of strain (%) for wood treated with, (a) MFFA/DMDHEU/nanoclay/MWCNT (0.5 phr), (b) MFFA/DMDHEU/nanoclay/MWCNT (1.0 phr) and (c) MFFA/DMDHEU/nanoclay/MWCNT (1.5 phr).