

COMPRESSION AND HARDNESS WITH FTIR CHARACTERIZATION OF UHMWPE NANOCOMPOSITES AS ACETABULAR CUP IN HIP JOINT REPLACEMENT

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ABSTRACT

Eight nano composites were prepared to use as an acetabular cup for hip joint implantation with a matrix of UHMWPE and nano-reinforcements include carbon nanotubes (CNTs) and nano hydroxyapatite (nHA) by adding four weight fractions involve (1, 2, 3 and 5%wt) of each material. FTIR spectra were used to identify the incorporation between the matrix and nano fillers and the shifting in main peaks confirmed the good cross linking that occurs within the composites structure.

Compression and hardness for prepared nanocomposites were investigated. The compressive strength was increased to get the highest values for UHMWPE/3%nHA followed by HUMWPE/3%CNTs composite due to nature of hydroxyapatite particles to fill the voids compared with the structure of nanotubes. The improving of hardness also observed at 3% of nanoadditives, but UHMWPE/3%CNTs composite has a hardness higher than HUMWPE/3%nHA because of the structure of tubes that act as fibers to get hard material compared with reinforcing by particles of HA.

KEYWORD: Hip Joint Replacement, Acetabular Cup, Nanocomposite; UHMWPE, Nano Additives, Hardness, Compression & Toughness

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