Polycaprolactone, Sodium Hyaluronate, Multiwalled Carbon Nanotubes, and Mimosa Tenuiflora composites were used to fabricate biodegradable porous scaffolds for applications in bone tissue engineering by thermally induced phase separation technique. The influence of several parameters in the morphology and mechanical properties of scaffolds, such as polymer concentration, quenching temperature, and the incorporation of different concentrations, were investigated. Through the use of Scanning Electron Microscopy (SEM), the variation of porous morphology was studied. Characterization was performed using Fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and mechanical properties. In vitro enzymatic biodegradation and bioactivity tests were used to evaluate the degradation and bioactivity of the biocomposite and the viability to form hydroxyapatite. The results obtained until now show that PCL/HA/MWCNT/Mimosa Tenuiflora scaffolds are suitable for biological applications.

**Keywords:** Biocomposites, Tissue engineering, Osteoblast

**Presenting author's email:** rocilim2@yahoo.com