

Mechanical Properties Evaluation of Helical Multiwall Carbon Nanotubes (HMWCNTs) Enhanced Composite

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Abstract

Composite materials are widely used in various engineering fields due to their superior properties over traditional materials. Among the different types of composites, carbon nanotubes (CNTs) reinforced epoxy composites have attracted great attention because of their high strength, stiffness and other properties. This project aims to fabricate an epoxy reinforced Nanocomposite (HMWCNTs), study the effect of different concentration and evaluating its mechanical properties.

Objective

- Nanocomposite preparation & fabrication
- Tensile , Impact and Hardness testing of the fabricated Nanocomposite.
- Characterize the fracture surface of the Nanocomposite

Methodology

Figure 1 show the steps we followed for the fabrication of HMWCNT/polymer nanocomposite. Also Figure 2 show the equipment at PSAU and SABIC company labs for mechanical testing .



Figure 1. Steps of HMWCNTs/epoxy nanocomposites fabrication



Tensile Test



Impact Test



Hardness Test

Figure 2. Tests in PSAU laboratories used tensile and hardness tests, and impact testing was used at SABIC

Application



Aerospace



Automotive parts



Electronics

Results

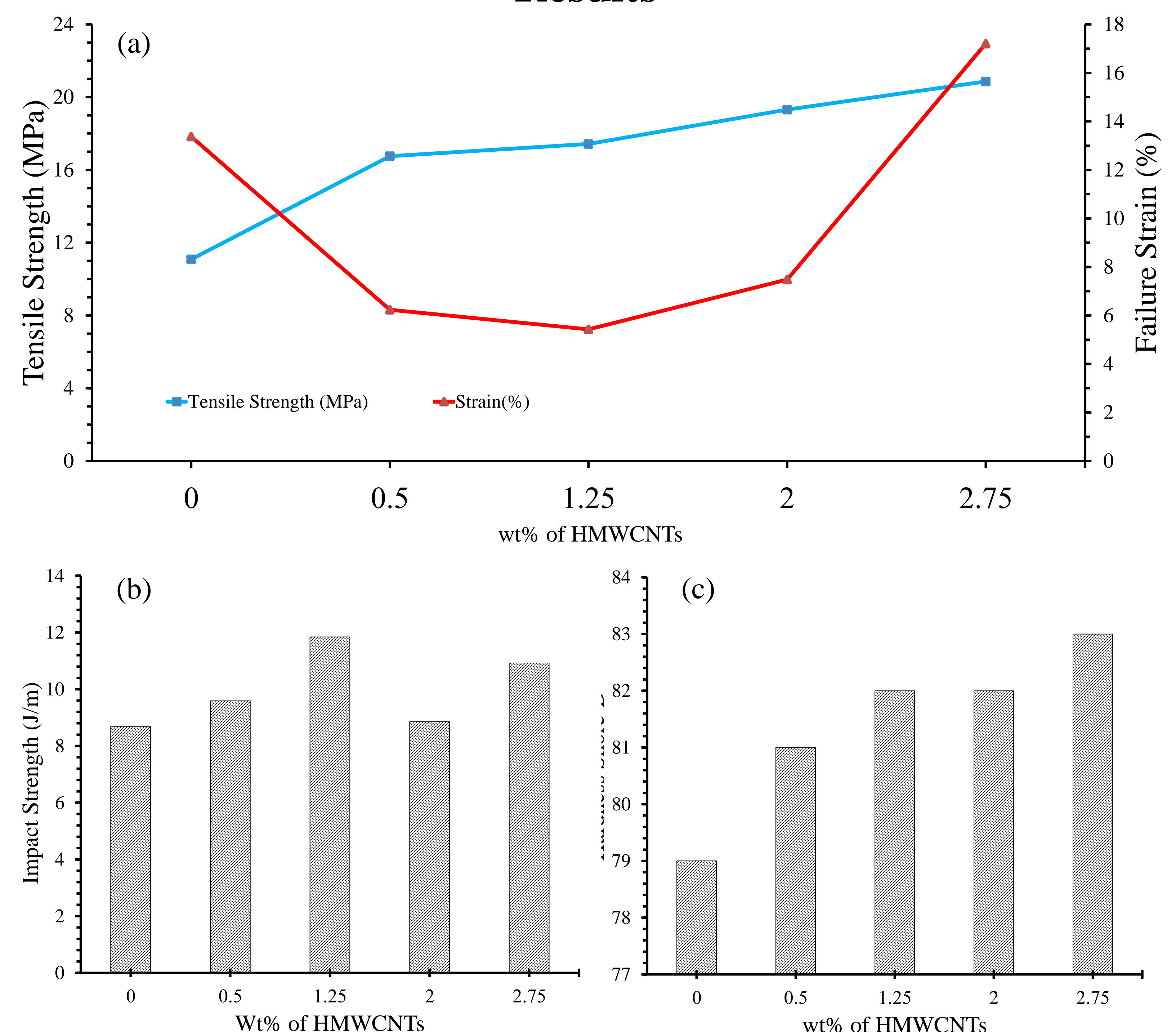


Figure 3. Tensile, Impact and Hardness properties of HMWCNTs/epoxy Nanocomposite: (a) Tensile Strength and Strain, (b) Impact Strength, (c) Hardness Shore-D

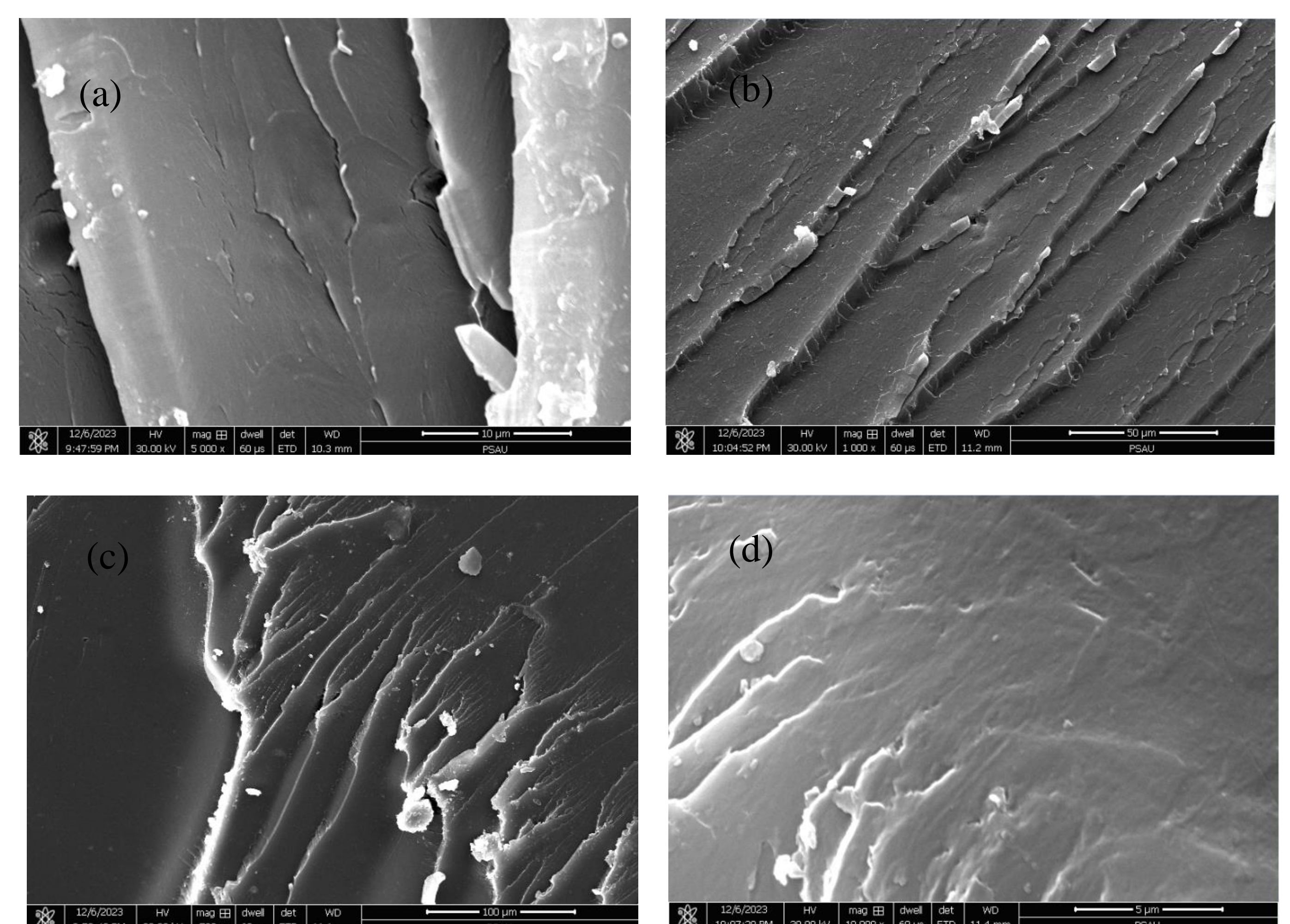


Figure 4. SEM micrographs of the fractured surfaces (a) 0.5 %, (b) 1.25 %, (c) 2 %, and (d) 2.75 % HMWCNT reinforced composites.

Conclusions

In this project, the effect of different concentrations was studied and its mechanical properties were evaluated. It also became clear to us that at a concentration of 2.75%, the tensile strength increased. The improvement in the impact test was for the 1.25% concentration and the improvement in the hardness test was slight.