CHAPTER 5

CONCLUSIONS AND SUGGESTION FOR FUTURE WORK

5.1 Synthesis of Silicon Carbide Nanowires and Characterization

The chemical vapor deposition method has been developed to produce SiCNWs by small diameter, homogeneous, high qualities, high quantities (grams scale) SiCNWs, especially, low cost route. The results revealed that SiCNWs were successfully synthesized by the CVD which the optimum condition is reaction temperature at 1,350°C using Ni_2O_3 as catalyst. The diameter of wires are in the range of 30-100 nm with the average size of approximately 54.64 nm and the length up to several microns. There are five peaks in the spectrum agreeing well with the known values of (111), (200), (220), (311) and (222) diffraction peaks of cubic β-SiC correspond to the FCC structure of β-SiC and has no impurity was detected, suggested that the XRD result is in good agreement with the SEM and TEM images.

5.2 Composites Processing and Characterization

The combination of CNTs, SiCNWs and epoxy resin nanocomposites were prepared using CNTs and SiCNWs as the dispersion phases and epoxy resin as the matrix material. The CNTs, SiCNWs and epoxy resin nanocomposite materials were fabricated based on ultrasonic mixing and casting technique. The main trends outlined in this work are as follows:

5.2.1 The CNTs, SiCNWs and epoxy resin nanocomposites were successfully fabricated using ultrasonication mixing method and casting technique.

5.2.2 Adding the nano-fillers phases into the polymer-based phase can promote the mechanical of single phase polymer-based, especially, tensile strength and compressive strength.

5.2.3 The density of the nanocomposites samples is slightly higher than that of the neat epoxy resin.

5.2.4 The ratio of CNTs: SiCNWs is 25:75 at 0.2 vol%, the tensile and compressive strength have the maximum values of 48.59 MPa and 122.30 MPa, respectively, the absorbed energy has the maximum value of 0.28 J

5.2.5 Adding SiCNWs content was 75 parts mixed with 25 parts of CNTs content on condition 0.2% volume provided the highest gain strength.

5.2.6 Wear track and wear rate lowest decreased as CNTs:SiCNWs is 25:75 at 0.2 vol% of the fillers with the values of 253.88 μm and 0.29 μm^2 respectively. Loss wear track and wear rate in percentage as 48.99 % and 86.89%.

5.2.7 SEM micrograph of all composite samples indicated that CNTs were not very well dispersed in the matrix.

5.3 Suggestion for Future Work

5.3.1 In the future, sources and catalyst will be intentionally added more contents in order to get higher amount of nanowires.

5.3.2 In order to decrease of impurities contents in the products, the system should be improved by high vacuum pump.

5.3.3 Adding the fillers with wider range in the matrix for get more details.

5.3.4 Low density, stiffness and good adhesion epoxy resin should be employed as the matrix phase because these properties could enhance the mechanical properties and reduce the porous

5.3.5 The stirring mixing technique should be used for the mixing process.

5.3.6 Carbon nanotubes should be purified by using oxidation reaction, high concentrate acid treatment, and strong frequency ultrasonication, etc