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Physical characterization and mechanical properties of biomass based nano carbon black filled epoxy composites

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The production of carbon black is relatively expensive because of its dependence on dwindling supplies of crude oil [1]. Many researchers have evaluated an alternative for developing carbon from bio waste in a new way for the next carbon black generation [2]. Biomass materials, which are rich in lignocellulosic fibers, can produce biocarbon (carbon black) after carbonization because they have high fixed carbon content [3].

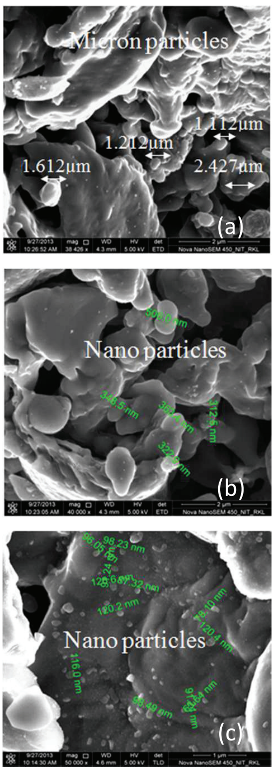

Figure 1: (a-c) SEM of carbon particles prepaed by bio mass at differnt temparature

Nano Carbon black derived from coconut shells were obtained by pyrolysis of shell particles at various carbonization temperatures (400 °C, 600 °C and 800 °C) and used as reinforcement in epoxy composites. The obtained carbon black particles were characterized using proximate, ultimate and BET analysis. The SEM analysis reveals that as the temperature increases the particle size of the carbon changes to micro to nano.

Fabricated bio composites were characterized for mechanical and morphological properties. The results obtained from mechanical test revealed that as the carbon black content increases in neat epoxy tensile strength and flexural strength increases up to some extent but after high filler loading the strength is slightly decreasing due to formation of void or agglomeration. Proximate analysis concludes that the carbon percentage increases due to pyrolytic decomposition of shell particles and morphological analysis showed the good bonding between the carbon black and epoxy in polymer composite.

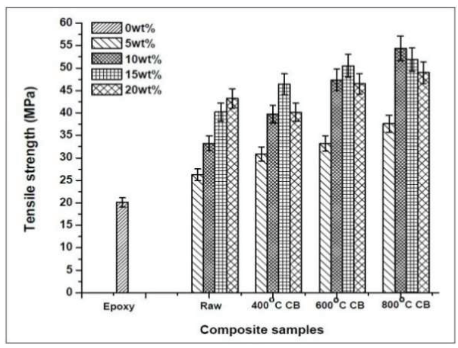

Figure 2: Tensile strength

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