

Preparation and characterisation of mango bark and mango leaf nanoparticles for lubrication

James Lau Tze Chen 1, A. N. Oumer 1, Azizuddin A. A. 1, M. A. At-Tasneem 1

1 Faculty of Mechanical Engineering, University Malaysia Pahang, Malaysia
nurye@ump.edu.my

Abstract:

Nanoparticles are the simplest form of structures with sizes in the nanometre range (<100 nm). Suspended nanoparticles (non-bio) in base fluids (nanofluids) increase the heat transfer properties of the base fluids. However, addition of nanoparticles to the base fluid increases viscosity as well as pressure drop. It is also expensive to produce non-bio nanoparticles. Thus, mango barks and leaves were used to produce bio nanoparticles due to their natural characteristics that might lower viscosity of the nanofluid. The mango bark and mango leaf were collected and dried under hot sun to remove moisture content until constant weight achieved. Then, the materials were crushed and sieved to obtain finest powder followed by wet grinding for 1 hour at 800 rpm using FRTSCH Planetary Micro Mill PULVERISETTE 7 premium line. The particles size was determined using FESEM and particle size analyser machine. The bulk density of the nanoparticles was determined by experiment. The obtained results showed that the mango barks have lost total weight of 504g (63%) after 8 days of drying. Meanwhile, mango leaves have lost total weight of 606g (78%). The bulk density of mango bark nanoparticles is 2505.00kg/m³ and mango tree leaf nanoparticles is 2108. 00kg/m³. From image analysis using FESEM, the average size of mango bark nanoparticles is around 102 nm and mango leaf nanoparticles was around 132 nm. From particle size analyser, the average fineness of mango bark nanoparticles measured by intensity was 125.5nm and mango leaf nanoparticles was 206.1nm. In conclusion, the mango bark and mango leaf nanoparticles can be synthesised by wet grinding method.

Keywords: Nanofluid; Nanoparticle; Physical Properties; Density; Moisture Content

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