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I n f l u e n c e   o f   s o n i c a t i o n   t i m e   o n   t h e   p e r m i t t i v i t y   o f   a   g r a p h e n e   n a n o f l u i d

Abstract

The preparation of nanofluids is one of the most important tasks for the stability of nanofluid, and therefore, for its electromagnetic characterization. In the present work, the preparation of the nanofluido was carried out by the two steps method, using an ultrasonic homogenizer so that the dispersion of the nanoparticles be uniform, thus avoiding the formation of aggregates. The time interval to which the ultrasound is subjected is a variable yet to be improved. There are several studies on this point, but there is still no consensus on the subject.

The influence of the sonication time on the determination of the permittivity for the nanofluid liquid paraffin with 0.75% (*V/V*) of graphene nanoparticles was investigated to determine the best time interval for the performance of nanofluid. The intervals that were analyzed were those of 40 min and 150 min. The choice of these two ranges is due to the previously realized UV-Vis spectra. Figure 1 shows the variation of the loss factor as a function of the angular frequency for 150 min(o) and 40 min(•) at the temperature of 293.15K, without the contribution of electrical conductivity d.c..

The characteristic parameters of the *Cole-Cole's* dielectric function[1][2][4] were determined for nanofluid with 40 min sonication and *Cole-Davidson* dielectric function for nanofluid with 150 min of sonication. [1][3][4]

Figure 2 shows the *Argand diagram*[5] for a better visualization of the difference in the response of both systems to the sonication time. It is verified that an excess of sonication time can result in the lose of the physical characteristics of the nanofluid.

R e f e r e n c e s

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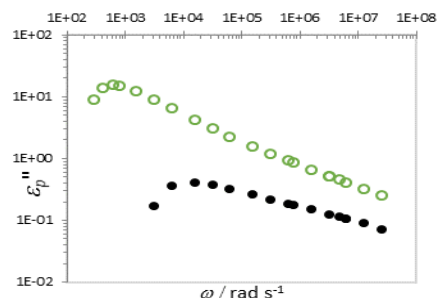
F i g u r e s

Figure 1: Variation of the loss factor as a function of the angular frequency of the nanofluid for 150 min (o) and 40 min(•).
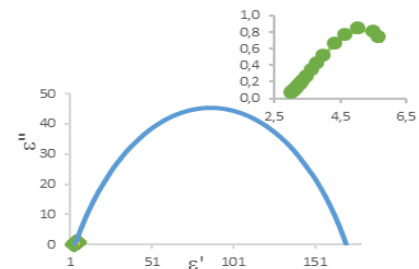

Figure 2: Argand diagram for 150 min of sonication (•) and for 40 min (–) of paraffin nanofluid with graphene.