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Nano spear grass' cellulose, egg shell, chalk and potassium acetate; A comparative assessment of gelling capacities in the production of bio gel fuel for clean energy environment

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Locally available spear grass specie was harvested and processed into a nano cellulose form using a locally modified attrition method. The nano cellulose obtained was employed as a gelling agent in the production of bio gel fuel. Other bio gel fuel samples were also produced using acetate materials from egg shells, school chalk and Potassium salt (obtained from a chemical vendor). The XRD peak at gives an indication of the nano size of the cellulose material obtained from the spear grass while the FTIR and UV-VIS spectra results presented the presence of relevant OH and COOH functional groups. A comparison of the gelling capacities of the four gelling agents (at 60% concentration) vis-à-vis amount, viscousity and colour; gave a 10% (w/w) gelling potential for the nano cellulose, 23% (w/w) for egg shell acetate 28% (w/w) for school chalk and 26% (w/w) for potassium acetate. Heat of combustion based on material burnt [BTU/ib] for the nano cellulose sample gave a higher value of 13800 with the egg shell given 13400, school chalk gave 13300 and the potassium sample gave 13400 as well. The viscousities in centipoises at two important temperatures of 27°C and 90°C, are nano cellulose (25000 & 19500), egg shell (23500 &18900), school chalk (23500 &18900) and potassium acetate (24000 & 19000). The result obtained encourages the use of nano cellulose in the production of environmentally friendly bio gel fuels despite the initial rigorous processing of the raw material into the nano cellulose form.

Biography

Eneji I S is a senior lecturer and the current head of the department of Chemistry, university of Agriculture Makurdi Nigeria. He has over seventeen (17) years experience working as a lecturer and research Chemist. He is a PhD holder in Environmental Chemistry. He is a chartered chemist and belongs to reputable professional bodies like the Chemical Society of Nigeria. He is 47 years and has over 40 international and national conference paper presentations with more than 27 peer reviewed journal publications and has authored a textbook on water quality analysis. To date he has supervised 43 post graduate students both at the Masters and Doctoral levels. He has three scholarly awards and three honors and distinctions. His most recent contribution to the academic world is the 2012 IUPAC adopted method of analysis protocol, developed by him.

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Graphene excels the race against multi-walled carbon nanotubes infused with polyaniline: Sulphonation and amine investigation

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Here, we discuss one of the simplest approaches for chemical functionalization of in-situ prepared polyaniline (Pani) and its nanocomposites with multi-walled carbon nanotubes (MWCNTs) and graphene (GN) in chlorosulphonic acid bath. Their effect of polymerization and functionalization was characterized by Fourier transform infrared spectroscopy (FTIR), x-ray diffraction analysis (XRD), field emission scanning electron microscopy (FESEM) and electro-thermal analysis. Results also revealed the presence of π–π interactions between Pani and carbon allotropes leading to the formation of charge-transfer complexes. The strong pπ–pπ interactions significantly increased the resultant electrical conductivity and stabilizing them as well. Further, theirs back to back sulphonation in chlorosulphonic acid significantly enhanced the solubility in one way but caused a heavy loss in conductivity. The thermoelectric properties of the as-prepared nanocomposites were investigated as a function of MWCNTs and GN contents. It was observed that as-prepared Pani/GN nanocomposites showed greater electrical conductivity as well as improved thermal stability in terms of DC electrical conductivity retention under isothermal and cyclic ageing conditions compared with Pani/MWCNTs and pure Pani. Finally, these oxidative products were also studied for their sensing response towards amines to detect whether the particular compound is either 1°, 2° or 3° amine.

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