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Big return of the deceased ion-exchanger in the field of nanotechnology as a part of ternary nanocomposite comprising of functionalized carbon nanotubes, PANI and zirconium molybdate (ion exchanger)

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In the last few decades, Nano-composites have been the topic of interest. Carbon-nanotubes are of significant scientific importance due to their remarkable properties in almost every field, be it electronic, mechanical, thermoplastic, optical, electrical, biological, and environmental. The field of material science is currently undergoing a shift from developing traditional materials such as metals, ceramics, polymers and composites to a more revolutionary trend of developing nanostructures, which are functionalized, self-assisting and occasionally even self-healing. Albeit, these advances are potentially game-changing, excitement must be tempered somewhat as several bottlenecks exist.

Nitric and sulphuric acid(1:3 ratio) treated or functionalized MWCNT(A-CNT) were ultra-sonicated with PANI and ZrMo to obtain a ternary nano composite i.e.CNT/PANI/ZrMo. Inorganic part i.e. zirconium molybdate ion-exchanger is prepared by combining ammonium molybdate with zirconium oxychloride. Since, the composite formed is ternary, PANI, the third component is added in all the three samples and in-situ polymerization occurs. KPS or APS is used as polymerization initiator or oxidizing agent. Three composite sample prepared, one is ZrMo/PANI, the second one is ZrMo/PANI /(.25g)MWCNT and the third one ZrMo/PANI/(.75g) MWCNT. These samples are properly dispersed using ultra-sonicator and centrifuged for proper separation in the presence of SDS/DBSA/CTAB which acts as a surfactant. The composite when underwent various studies showed enhanced thermal conductivities, photocatalytic activity, antibacterial and anti-cancer properties as well. TEM and SEM analysis defined the morphology and excellent dispersion of CNTs in the composite where CNT appears as an axis over which PANI is surrounded like a uniform layer and ZrMo is filled in the inner cavities both giving backbone to the Nano composite.

Biography

Yashfeen Khan is a doctoral student under the supervision of Professor Anees Ahmad in the PhD program, Nanoscale material science, Department of Chemistry at Aligarh Muslim University, Aligarh. India. Her main research interest centers around Carbon-dots and the development of carbon nanotubes based new nano-composites, to characterize the synthesized nano-composites by SEM, TEM, AFM, NMR, FTIR, RAMAN, XRD and TGA-DTA and various other techniques. Also, to figure-out the un-reported future applications of the synthesized materials in the areas: reinforcement, sensing(chemical and biological), cytotoxicity and cell line culture, anti-bacterial, optical activity, super-capacitance ability.

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