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Synthesis and Characterization of RGO / TiO_2 / PANI Different Composites

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Reduced Graphene Oxide (RGO) / TiO_2 / Polyaniline based composites have been synthesized and characterized. Graphite Oxide (GO) synthesized from Kahatagaha vein graphite ore, in Sri Lanka was used. Chemical oxidative polymerization of aniline in the presence of ammonium persulphate as a oxidant was carried out. The product was added to the ultra sonicated GO / TiO_2 solution and nine different composites (S11 –S33) were prepared with various percentages of GO, TiO_2 and aniline. Each composite was characterized using XRD, FTIR and SEM technologies. The broader intensity peak of GO at 2θ =11° was observed, which corresponds to the (0 0 1) plane. The corresponding TiO_2 peaks are observed at 2θ = 25.40°, 38.1°, 48.8°, 54.9°, 56.1°, 64.1°, 76.3°, with crystal planes of (1 0 1),(0 0 4),(2 0 0), (1 0 5), (211), (204), and (2 1 5) respectively. The XRD pattern of PANI has a broad band at about 2θ = 25° observed in each composite with different intensities. Characteristic peaks at about 2250–2800 cm^{-1} have been assigned to C–H stretching modes; O–H stretching vibration peaks at 3200- 3400 cm^{-1}, and C=O stretching vibration peaks at 1600-1700 cm^{-1} were observed in each sample. The heat treatment process was used to convert GO to RGO and the C=C bond at 1506-1597 cm^{-1} was observed in each sample, which corresponds to RGO. The peaks at about 1245-1252 cm^{-1} can be assigned to the characteristic peaks of intrinsic PANI, corresponding to the C–N. The peaks at about 685-770 cm^{-1} correspond to Ti–O–Ti in TiO_2. The results indicated that RGO /TiO_2 / PANI was successfully synthesized in each sample. The SEM images show that TiO_2 and PANI in the S11 to S33 RGO/TiO_2/PANI composites are well-distributed and closely related to each other. Also these kinds of morphologies of composites give higher surface area. Further research is underway to optimize the above composites and investigate them for electrode material for supercapacitors.

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