



Preparation and characterization of polymer based ferrites

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Abstract— This review is designed to be a comprehensive source for polymer nanocomposite research, including fundamental structure/property relationships, manufacturing techniques, and applications of polymer Nano composite materials. Asphaltenes can cause enormous losses in the oil industry, because they are soluble only in aromatic solvents. Therefore, they must be removed from the petroleum before it is refined, using flocculants agents. Aiming to find new materials that can work as flocculent agents to asphaltenes, cobalt ferrite nanoparticles were chemically modified through acid-base reactions using dodecylbenzene sulfonic acid (DBSA) to increase their lipophilicity. Nanoparticle synthesis was performed using the co-precipitation method followed by annealing of these nanoparticles, aiming to change the structural phase.

The ion conducting polymer composite specimen has been prepared by using Polyvinyl- pyrrolidone (PVP) and Potassium hydroxide (KOH) using double distilled water as the solvent. The solution cast techniques was used to prepare the specimens. The main objective of the project is to study structural and mechanical properties of the polymer composite specimen. The conductivity and micro structure analysis has been carried out.

Keywords- polymer; ferrite; nanomaterial, polymer,

I. INTRODUCTION

The development of radar absorbing materials (RAM) is fundamental in stealth technology, as well as in other applications in the microwave range. The reduction of electromagnetic interference and the solution of electromagnetic compatibility problems are necessary. Thus, many researchers are focusing their interest on producing materials suitable for large EM wave absorption. The absorption of EM waves occurs in magnetic materials due to

their magnetic losses. Ferrites are also used as microwave absorbers. Some ferrites absorb microwave by loss interactions of the electric and magnetic field vector of incident waves and in the process convert microwave energy

Into thermal energy. Spinel ferrites based on Ni-Zn have been used as high-frequency ferrites for transformer cores, rod antennas, and radio frequency and more recently as radar absorbing materials (RAMs). Ferrites with a submicron grain size are some of the most promising materials in magnetic Nano composites for the absorption of microwave radiation. (Fadzidah Mohd Idris1, 2014)

II. FERRITES

Ferrites are known for their magnetic effect as early as 1954. These are the main materials (oxides) responsible for magnetic effect in magneto polymer matrix composites (MPMCs). Gabriel and co-workers (G. Andrei, 2006) proposed a model explaining the mechanism by which magnetism evolve in magneto polymer matrix composites. They explained the generation and evolution of magnetism in magneto polymer composite on the basis of mechano-quantum theory in which paramagnetism of oxygen (at tetrahedral or octahedral sites in ferrite) is explained by means of molecular orbital method (MOM). The diagram in Fig.1 below is utilized to explain paramagnetic behavior of oxygen molecule. It is clear that there are two unbound electrons in the anti-bonding orbitals π_{2px} and π_{2py} and according to Hund's rule anti-bonding orbitals having the same energy are populated by one and only one electron at one time.

This accounts for paramagnetic behavior of oxygen in the presence of external magnetic field. Another theory accounts for unequal distribution of cation and anions in

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