Name: *Sajid Iqbal*

Topic: *Exploring Ferrite based Hybrid Conducting Polymers and their Applications*

Department: *Department of Chemistry*

Supervisor: *Prof. Sharif Ahmad*

Abstract

Ferrite is a ceramic material possess excellent chemical, thermal stability along with high electrical and magnetic properties. These properties provide them an opportunity for their application in the field of magnetic recording, permanent magnet, transformer core, integrated circuits, electromagnetic interference (EMI) shielding devices etc. Ferrites have a high potential for application in several electromagnetic devices in the radio frequency region since they have frequency-dependent physical properties such as permittivity and permeability. They have been prepared using various methods such as co-precipitation, sol-gel, combustion, spray pyrolysis, hydrothermal etc. However, the major disadvantages associated with these materials is their low bandwidth in the 8-18 GHz region. This can be overcome through the application of coating/encapsulation/enwrapping of ferrites by conducting polymer. On this account, researchers, and scientists have moved forward to fabricate various materials with a view to minimize the EMI pollution. Amongst these, hybrid materials based on ferrite and conducting polymer have gained great interest due to their remarkable dielectric, magnetic, and conducting properties. The combination of these two moieties lead to the increase in various properties like chemical, electrical and

magnetic properties. The increase in dielectric and magnetic loss occurring within the material lead to the increase in shielding activity in the gigahertz region i.e. X and Ku-band. Keeping this in mind, the present thesis describes the synthesis and characterization of newly synthesized ferrites and their conducting polymer hybrid nanocomposites. The EMI shielding properties of these materials have also been discussed in the thesis.

Keywords: Conducting Polymer, Ferrite, Nanocomposites, EMI Shielding, Nanoparticles.