OUTLINE OF PROPOSED RESEARCH
SYNTHESIS AND CHARACTERIZATIONS OF FERRITE NANOPOWDER

Nanoparticles are those particles that are less than 100 nm in size . Nanotechnology is considered to be one of the most important future technologies involving several discipline of science including; solid state physics, solid state chemistry, materials engineering, medical science and biotechnology. The transition from bulk to nanoscale leads to a number of changes in structural, physical, magnetic and electrical properties. Due to high DC electrical resistivity and low dielectric losses, nanoparticles are potential candidates as high frequency electromagnetic wave absorbers. High transition temperature (ferrimagnetic to paramagnetic) makes them ideal for high temperature applications. Ferrites are iron containing complex oxide with interesting magnetic and electrical properties and have been studied extensively because of their important in basic as well as in applied research. The knowledge of cations distribution and spin alignment is essential to understand the magnetic and electrical properties of spinel ferrites. Ferrite nanoparticles or iron oxide nanoparticles (iron oxides in crystal structure of maghemite or magnetite) are the most explored magnetic nanoparticles up to date. Once the ferrite particles become smaller than 128 nm, they become superparamagnetic which prevents self agglomeration since they exhibit their magnetic behavior only when an external magnetic field is applied. The magnetic moment of ferrite nanoparticles can be greatly increased by controlled clustering of a number of individual superparamagnetic nanoparticles into superparamagnetic nanoparticle clusters, namely magnetic nanobeads. With the external magnetic field switched off, the remanence falls back to zero. Just like non-magnetic oxide nanoparticles, the surface of ferrite nanoparticles is often modified by surfactants, silica, silicones or phosphoric acid derivatives to increase their stability in solution

Importance:

Ferrite nano materials are chosen due to their high (>106 -cm) DC electrical resistivity, good magnetic properties, chemically stable over wide temperature range and low eddy current losses. They have potential applications in: ⍰ Electromagnetic absorbers, Data storage, Microwave devices, Core Material, Drug delivery etc.,

Objectives:

Synthesis and characterizations of Ferrite Nanopowder is the main objectives of this research proposal.

Technical programme:

Following technical studies are being involved in this research.
1. XRD (X-Ray Diffraction)
2. UV-Vis Spectroscopy
3. FT-IR Spectroscopy
4. SEM (Scanning Electron Microscope)
5. Magnetic Properties studies
6. Electric Properties studies

Views of Supervisor / Guide:

The proposed research work "SYNTHESIS AND CHARACTERIZATIONS OF FERRITE NANOPOWDER" Chosen by the research student has not been done earlier. The proposed work is possible one. Facilities to do this research work are available in our research laboratory.

Signature of Research student   Signature of Supervisor / Guide