Synthesis & Characterization of Bimetallic Nano Particles by Using PVP for Magnetic Storage Device

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Abstract: This work deal with the development of synthesis and characterization of bimetallic Nano particles by using (PVP) for magnetic storage device by mean of microwave irradiation method. with physical properties for a wide range of device applications. Ethanol Glycol as the solvent ammonia as a reducing agent Polyvinyl Pirrolidone (PVP) as a polymer. In this report, we have described NANO PARTICLES and its types. There are different types of synthesis methods specially microwave irradiation method. We have described their characterization techniques like EDX, TEM, and UV and also describe Magnetic Storage Device. We have tried to give proposed work for their application in Magnetic Storage device.
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Keywords: Synthesis; Characterization; Bimetallic; Nano Particle; Magnetic Storage Device

Introduction:

Nanotechnology can be defined as the application of controlling the properties of the matter at the molecular level [1]. Nanoparticles should be considered as a distinct state of matter such as crystalline nanoparticle forms (fullerenes and carbon nanotubes) and traditional crystalline solid forms (graphite and diamond). SOMETIMES limit the size of Nano materials between 10 and 100 nm [3].

Properties of Nanoparticles

There are different types of Properties in Nanoparticles.

1.1.1 Optical properties

Nanoparticles are particles between 1 and 100 nanometres (nm) in size with a surrounding interfacial layer. The interfacial layer is an integral part of nanoscale matter, fundamentally affecting all of its properties. The interfacial layer typically consists of ions, inorganic and organic molecules. Organic molecules coating inorganic nanoparticles are known as stabilizers, capping and surface ligands, or passivating agents. In nanotechnology, a particle is defined as a small object that behaves as a whole unit with respect to its transport and properties [9]. Particles are further classified according to structural parameters like diameter and some other characteristics.

- The properties like colour and transparency are considered as optical properties. These properties are observed to change at nanoscale level. For example bulk gold appears yellow in colour while in Nano size gold appears red in colour.
- Bulk silicon appears grey in colour while Nano sized silicon appears red in colour.
- Zinc oxide, which at bulk scale blocks ultraviolet light and scatters visible light and gives white appearance. While nanoscale zinc oxide is very small in particle size compared with wavelength of visible light and it does not scatters it. Thus it appears transparent [10].

The main reason for change in optical properties at nanoscale level is that nanoparticles are so small that electrons in them are not as freer to move as in case of bulk material. Due to this restricted movement of electrons, nanoparticles react differently with light as compared to bulk material.

1.2 Electronics Property

Conductivity of a bulk or large material does not depend upon dimensions like diameter or area of cross section and twist in the conducting wire etc. However it is found that in case of carbon nanotubes conductivity changes with change in area of cross section. It is also observed that conductivity also changes when some shear force (in simple terms twist) is given to nanotube. Conductivity of a multi walled carbon nanotube is different than that of single Nanotube of same dimensions. The carbon nanotubes can act as conductor or semiconductor in behaviour but we all know that large carbon (graphite) is good conductor of electricity. The complex interplay between charge transfer, hybridisation, and charge transport is the key to their application potential and to design novel materials with interesting electronic, optical and magnetic properties such as one-dimensional metals or spin chains, two-dimensional devices based on the curate superconductors, and solar cells [11].

Our methods comprise electrical transport measurements in a wide range of temperature, magnetic field, frequency, and current density, as well as a cutting edge spectroscopic approach using third generation synchrotron radiation sources for angle

resolved photoemission spectroscopy and X-ray absorption and a laboratory-based system combining photoemission, Raman, IR, UV/Vis and luminescence spectroscopy.

2 Magnetic Property

Magnetic properties Magnetic NMs exhibit great potential applications such as magnetic data storage, microwave Absorption, magnetic fluid andbiomedicine. The performances of magnetic NMs are critically dependent on their magnetic features, containing temperature dependent blocking temperature (Tb), field dependent coercively and saturation magnetization (Ms). For bimetallic system, the magnetic property is strongly dependent on the antiparticle and intraparticle interaction, which can be controlled by their elements type, ratio, distribution and their geometry architecture. Magnetic bimetallic NMs, consisting of two kinds of magnetic elements such as Ni–Co or Fe–Ni, Fe–CoNPs, have been investigated by many Researchers; Magnetic nanoparticles are those which can be affected using magnetic field. These particles usually contain magnetic elements like iron, nickel, cobalt etc. Magnetic nanoparticles show a variety of unusual magnetic behaviour when compared to the bulk materials, mostly due to surface or interface effects, including symmetry breaking, electron environment or charge transfer and magnetic interactions. Let us discuss some other magnetic properties of nanomaterials with examples [12].

- The physical and chemical properties of magnetic nanoparticles mainly depend upon the chemical structure and method of synthesis. For example, Nano scale particles of magnetite show Super-Para magnetism at a transition temperature, which is smaller than the transition temperature of bulk material.
- Nanocomposite magnets consisting of uniform mixture of magnetically hard and soft phases have been extensively investigated in recent years due to their useful hard magnetic properties.
- High energy products and relatively high cervicitis can be developed in these Nanocomposite magnets. These magnets are high value of remanence and low cost.
- Magnetic studies in nanostructured materials have focused on the interaction between electron charges and magnetic spins and these studies have led to discoveries of new and unique phenomena that are neither observable in traditional bulk materials, nor explainable using classical theories. For examples: Giant Magnetoresistance (GMR) in multilayers and metallic granular solids, spin valves, spins injection etc. [13]
- Magneto restrictive materials are of great scientific importance to us. Magneto restriction is the process in which magnetic material deformed due to presence of magnetic field.

Magneto restrictive Nano scale films can allow such functions, which cannot be done using existing integrated circuits. For example these constitute driving elements of micro robots, pumps, motors etc. These can also be used for magnetic control of elastic properties or dependence of stress or strain on magnetic permeability to develop various electronic devices like a resonator with magnetically adjustable frequency and stress controlled inductance.

Experimental: SAMPLE 1

$(FeNo_3)^3$ Co) 4:1.

- After Calculating We Are measuring required amount of **Ferric Nitrate, Cobalt Nitrate, *and Ethylene glycol.***
- *Required amount of All Compounds Are Mixed in 10ml* ***Ethylene glycol.***
- *After Mixed Put* ***PVP (***PolyvinylPyrrolidone) in ***Ethylene glycol*** *of required amount.*
- *Mixed* **reducing agent Ammonia (Nh_3)** 400 microliter.
- *Kept Solution in Beaker & Cover by Aluminium Foil.*
- Starring the Solution by keeping it on magnetic Starring machine two hours.
- After 2 Hour take solution and Provide Heating using Microwave heater.
- Microwave Owen using 3 min 200 °***C.***
- After filtration we get Nano Particles.

Calculation

- 4.8 ml mole of **$(FeNo_3)^3$**We need = 404*4.8*10*10-3=0.1939g=19.39mg
- 1.2ml mole of **(Co $(No_3)^3$)** We Need = 291 *1.2 * 10*10-3=3.49mg.
- 6ml mole of **PVP** We Need =1000*6*10-3=0.6mg.
- Ammonia of **NH_3** need= ***400*** *𝔩*(***microliter***).

Sample 2.

$(FeNo_3)^3$Co) 1:4.

- After Calculating We Are measuring required amount Of **Ferric Nitrate, Cobalt Nitrate**, ***Ethylene glycol.***
- *Required amount of All Compound & Are Mixed in 10ml* ***Ethylene glycol.***
- *After Mixed Put* ***PVP (*** Polyvinylpyrrolidone) in ***Ethylene glycol*** *of required amount.*
- *Mixed* **reducing agent Ammonia (Nh_3)** 400 microliter.
- *Kept Solution in Beaker & Cover by Aluminium Foil.*
- Starring the Solution by keeping it on magnetic Starring machine two hours.

- After 2 Hour take solution and Provide Heating using Microwave heater.
- Microwave Owen using 3 min 200 °***C.***
- After filtration we get Nano Particles.

Calculation

- 1.5 ml mole of **$(FeNo_3)^3$**We need = 404*1.5*10*10-3=6.06mg=0.00606g
- 6 ml mole of **$(Co\ (No^3)_3)$** We Need = 291 *6 * 10*10-3=17.46mg=0.01746mg.
- 7.5 ml mole of **PVP** We Need = 1000*7.5*10-3=75mg.=0.075g.
- Ammonia of **NH_3** need= ***400*** *ml* (***microliter***).

Sample 3.

($MnSo_4$, $(FeNo_3)^3$) 1:4.

- After Calculating We Are measuring required A Mount of **Ferric Nitrate, Manganese Sulphate**and***Ethylene glycol.***
- *Required amount of All Compound & Are Mixed in 10ml* ***Ethylene glycol.***
- *After Mixed Put* ***PVP (*** Polyvinylyrrolidone) in ***Ethylene glycol*** *of required amount.*
- *Mixed* **reducing agent Ammonia (Nh_3)** 400 microliter.
- *Kept Solution in Beaker & Cover by Aluminium Foil.*
- Starring the Solution by keeping it on magnetic Starring machine two hours.
- After 2 Hour take solution and Provide Heating using Microwave heater.
- Microwave Owen using 3 min 200 °***C.***
- After filtration we get Nano Particles.

Calculation

- 1.5 ml mole of **$(FeNo_3)^3$**We need = 404*1.5*10*10-3=6.06mg=0.00606g.
- 6 ml mole of **($MnSo_4$ H_2O)** We Need = 169 *6 * 10*10-3= 10.1406 mg=0.010406g.
- 7.5 ml mole of **PVP** We Need =1000*7.5*10-3=75mg.=0.075g.
- Ammonia of **NH_3** need= ***400*** *ml* (***microliter***).

Sample 4.

($MnSo_4$, Co) 1:4

- **1.2** ml mole of Cobalt after Calculating We Are measuring required A Mount of **Cobalt, Manganese Sulphate**, ***Ethylene glycol.***
- *Required amount of All Compound & Are Mixed in 10ml* ***Ethylene glycol.***
- *After Mixed Put* ***PVP (*** Polyvinylyrrolidone) in ***Ethylene glycol*** *of required amount.*
- *Mixed* **reducing agent Ammonia (Nh_3)**400 microliter.
- *Kept Solution in Beaker & Cover by Aluminium Foil.*
- Starring the Solution by keeping it on magnetic Starring machine TWO hours.
- After 2 Hour take solution and Provide Heating using Microwave heater.
- Microwave Owen using 3 min 200 °***C.***
- After filtration we get Nano Particles.

Calculation

- **1.2** ml mole of Cobalt We need = 291*1.2*10*10-3=3.49mg=0.006349g
- 4.8 ml mole of **($MnSo_4$, 2O)** we Need = 169.01 *4.8 * 10*10-3= 8.11248 mg=0.008112248g.
- 7.5 ml mole of **PVP** We Need =1000*7.5*10-3=75mg=0.075g.
- Ammonia of **NH_3** need= ***400*** *ml* (***microliter***).

Characterization of Bimetallic NanoParticle

There are different types of Characterization.

3.1Energy-dispersive X-ray spectroscopy

Energy-dispersive X-ray spectroscopy (EDS, EDX, or XEDS) is an analytical technique used for the elemental analysis or chemical characterization of a sample. It relies on the investigation of an interaction of some source of X-ray excitation and a sample [28].

X-ray measurement

The equipment measures the energy and number of emitted X-rays.

- Equipment.

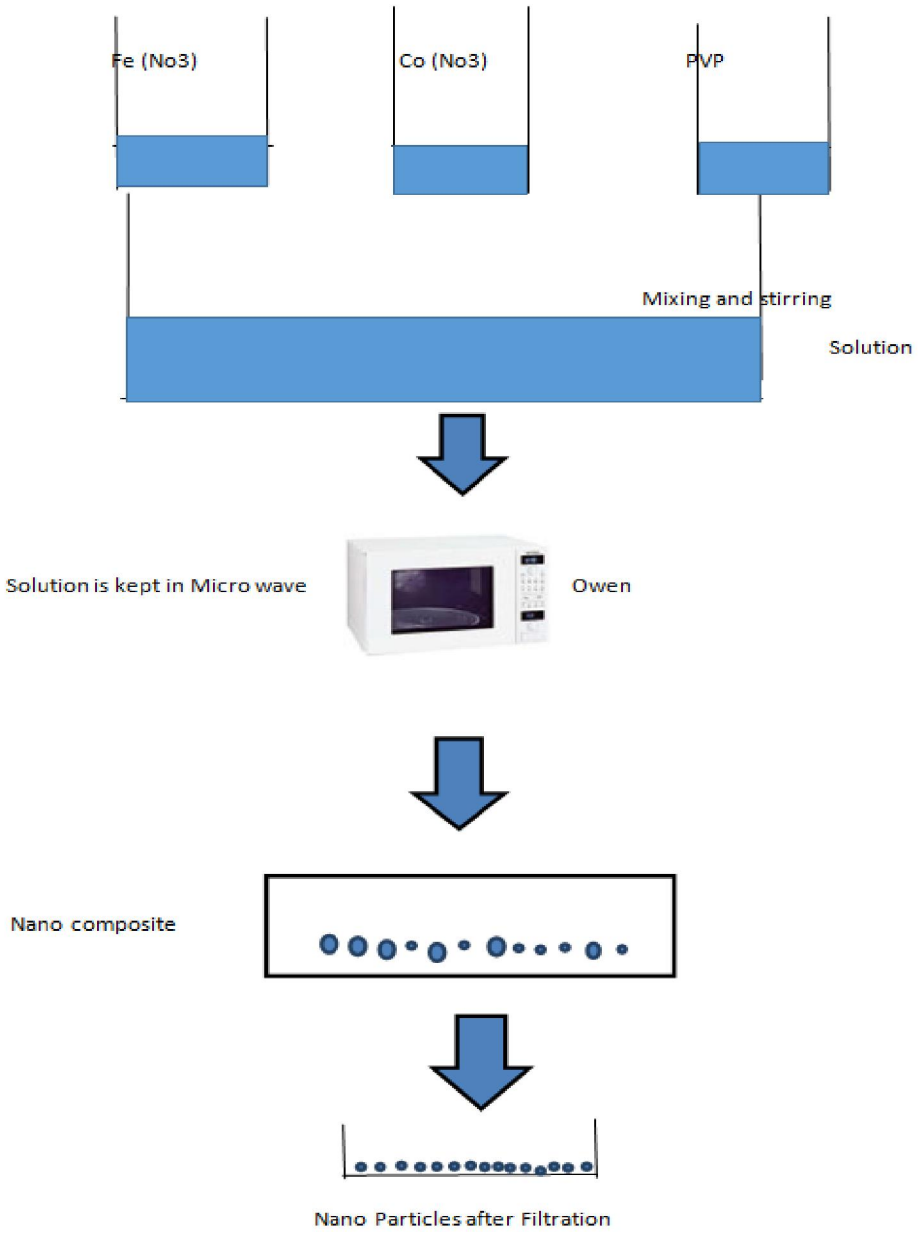
Four primary components of the EDS setup are

- The excitation source (electron beam or x-ray beam).
- The X-ray detector.
- The pulse processor.
- Theanalyzer.

Electron beam excitation is used in electron microscopes, scanning electron microscopes (SEM) and scanning transmission electron microscopes (STEM). X-ray beam excitation is used in X-ray fluorescence (XRF) spectrometers. X-ray Measures the signals and passes them onto an analyser for data display and analysis.

Technological variants, the excess energy of the electron that migrates to an inner shell to fill the newly created hole can do more than emit an X-ray. Often, instead of X-ray emission, the excess energy is transferred to a third electron from a further outer shell, prompting its ejection. This ejected species is called an Auger electron, and the method for its analysis is known as Auger electron spectroscopy (AES).

X-ray photoelectron spectroscopy (XPS) is another close relative of EDS, utilizing ejected electrons in a manner similar to that of AES. Information on the quantity and kinetic energy of ejected electrons is used to determine the binding energy of these now-liberated electrons, which is element-specific and allows chemical characterization of a sample [29].



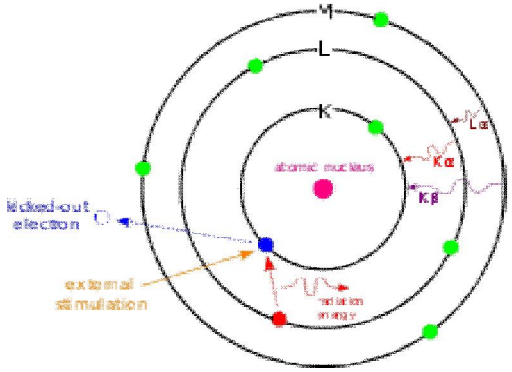


Figure 3.1The Principle of EDS

3.2Transmission electron microscopy (TEM)

The Principlesof TEM Transmission electron microscopy uses high energy electrons (up to 300 kV accelerating voltage) which are accelerated to nearly the speed of light. The electron beam behaves like a wavefront with wavelength about a million times shorter than lightwaves. Transmission electron microscopy (TEM, also sometimes conventional transmission electron microscopy or CTEM) is a microscope technique in which a beam of electrons is transmitted through a specimen to form an image. Higher resolution than light microscopes, owing to the smaller de Broglie wavelength of electrons. This enables the instrument to capture fine detail even as small as a single column of atoms, which is thousands

of times smaller than a resolvable object seen in a light microscope. Transmission electron microscopy is a major analytical method in the physical, chemical and biological sciences. TEMs find application in cancer research, virology, and materials science as well as pollution, nanotechnology and semiconductor research.

At lower magnifications TEM image contrast is due to differential absorption of electrons by the material due to differences in composition or thickness of the material. At higher magnifications complex wave interactions modulate the intensity of the image, requiring expert analysis of observed images. Alternate modes of use allow for the TEM to observe modulations in chemical identity, crystal orientation, electronic structure and sample induced electron phase shift as well as the regular absorption based imaging [30].

TEM images the transmission of a focused beam of electrons through a sample, forming an image in an analogous way to a light microscope (Figure 1). However, because electrons are used rather than light to illuminate the sample, TEM imaging has significantly higher resolution (by a factor of about 1000) than light-based imaging techniques. Amplitude and phase variations in the transmitted beam provide imaging contrast that is a function of the sample thickness (the amount of material that the electron beam must pass through) and the sample material (heavier atoms scatter more electrons and therefore have a smaller electron mean free path than lighter atoms).

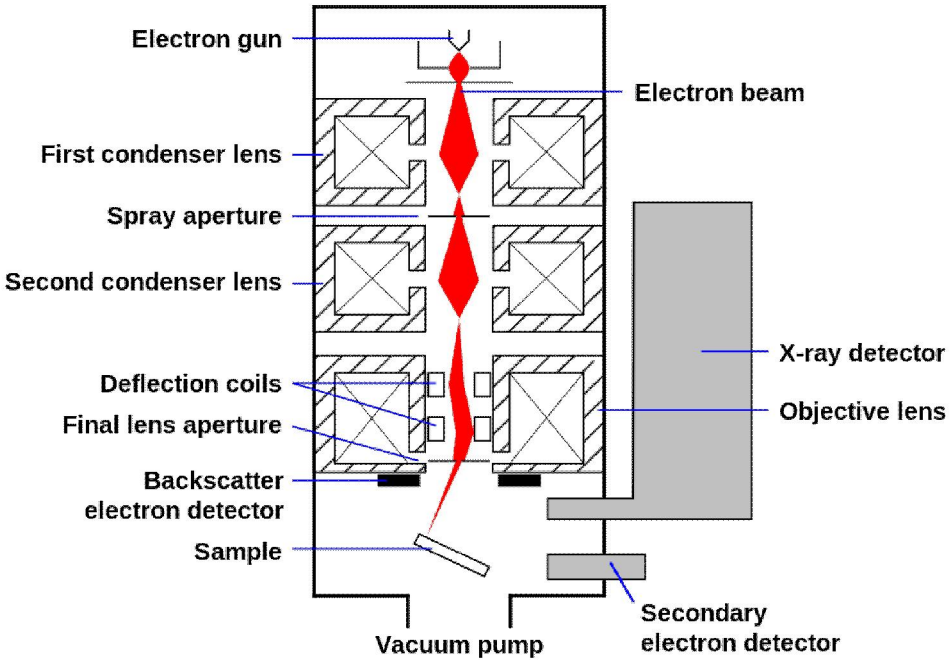


Figure 3.2 Schematic diagram of TEM

3.3UV –Visible Spectroscopy

Ultraviolet–visible spectroscopy or ultraviolet-visible spectrophotometry (UV-Vis or UV/Vis) refers to absorption spectroscopy or reflectance spectroscopy in the ultraviolet-visible spectral region. This means it uses light in the visible and adjacent (near-UV and near-infrared (NIR)) ranges. The absorption or reflectance in the visible range directly affects the perceived Colour of the chemicals involved. In this region of the electromagnetic spectrum, molecules undergo electronic transitions. This technique is complementary to fluorescence spectroscopy, in that fluorescence deals with transitions from the excited state to the ground state, while absorption measures transitions from the ground state to the excited state [31].

- **Principle of ultraviolet-visible absorption**

Molecules containing π-electrons or non-bonding electrons (n-electrons) can absorb the energy in the form of ultraviolet or visible light to excite these electrons to higher anti-bonding molecular orbitals. The more easily excited the electrons (i.e. lower energy gap between the HOMO and the LUMO), the longer the wavelength of light it can absorb.

Many molecules absorb ultraviolet or visible light. The absorbance of a solution increases as attenuation of the beam increases. Absorbance is directly proportional to the path length, *b*, and the

concentration, *c*, of the absorbing species. Beer's Lawstates that

$A = \varepsilon bc$,

Where eis a constant of proportionalitycalled theabsorptivity.

An absorption spectrometer works in a range from about 200 nm (in the near ultra-violet) to about 800 nm (in the very near infra-red) [32]. Only a limited number of the possible electron jumps absorb light in that region. That means that in order to absorb light in the region from 200 - 800 nm (which is where the spectra are measured), the molecule must contain either pi bonds or atoms with non-bonding orbitals. Remember that a non-bonding orbital is a lone pair on, say, oxygen, nitrogen or a halogen [33].

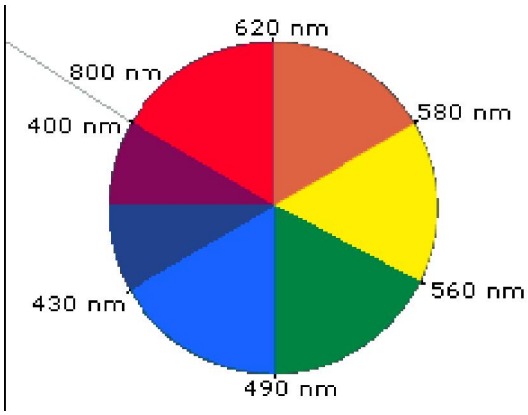


Figure.3.2Schematic ultraviolet-visible absorption

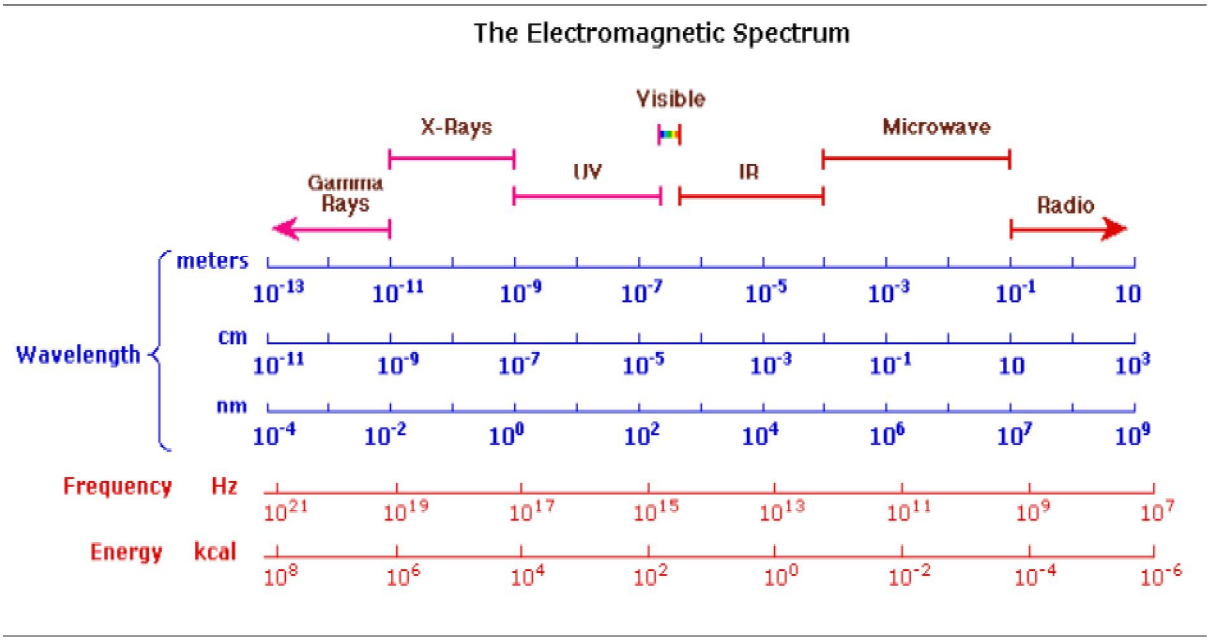


Figure3.1(ii) Show the electromagnetic spectrum and region and their corresponding wavelength, frequency and energy range.

Chapter-4

4. Result and Discussion

- EDXIn My Experimental We Get Particles By Elemental Analysis.
- TEM- We Get Surface Morphology.
- We are Synthesis Different-Different Size of BimetallicNano Particles ($MnSo_4$, Co) 1:4Ratio, ($MnSo_4$, $(FeNo_3)^3$) 1:4. Ratio, $(FeNo_3)^3$ Co) 1:4. Ratio, $(FeNo_3)^3$ Co) 4:1. Ratio.
- Characterization Size of Particles Co Mn500 nm, Fe Co 50nm, Fe-MN 1 um, Fe Co 200nm, FeMn-2um.
- We Are Getting Bulk Material By Bimetallic Nanoparticles.
- Both My image are non-Homogenous.
- Blue shift is for Nanoparticles show are particles are Nanoparticles.
- Fe MN Developed Because Highly Magnetized material, Bulk size.

4.1 Characterization of Ultraviolet

- By UV Characterization We Get Surface Plasmon Resonation.

Figure 4.1 shows UV graph of Fe MN. Red curve represents Fe MN in 10ul of PVP. Black cure represents FeMN in 5ul of PVP. We can see that absorbance is both cases are decreasing exponentially with increase in wavelength. At wavelength of 250nm Fe MN PVP 5ul. Is decreasing and become 0 to 400nm. In UV Graph Showing Blue shift absorption.

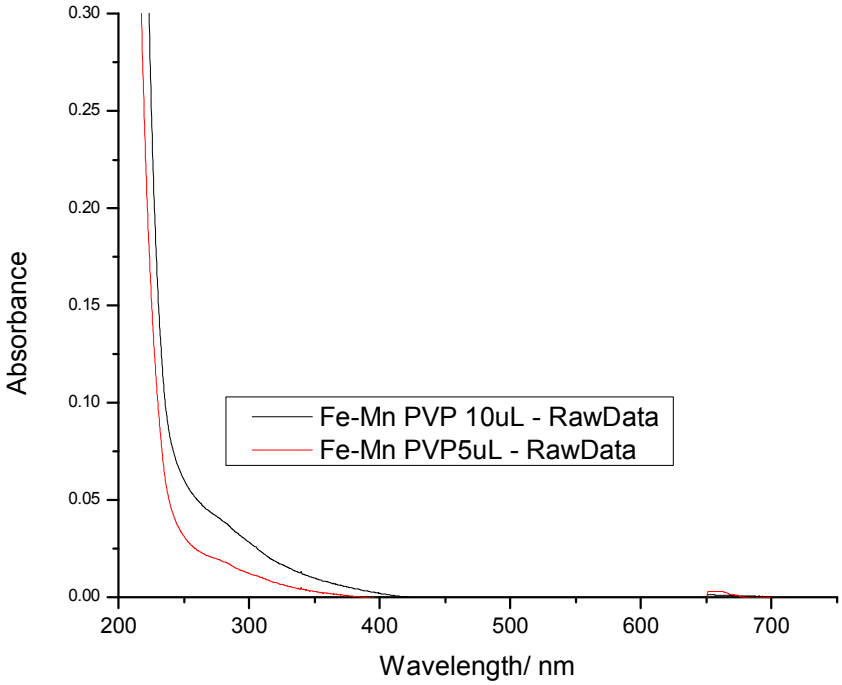


Figure 4.1 UV Graph

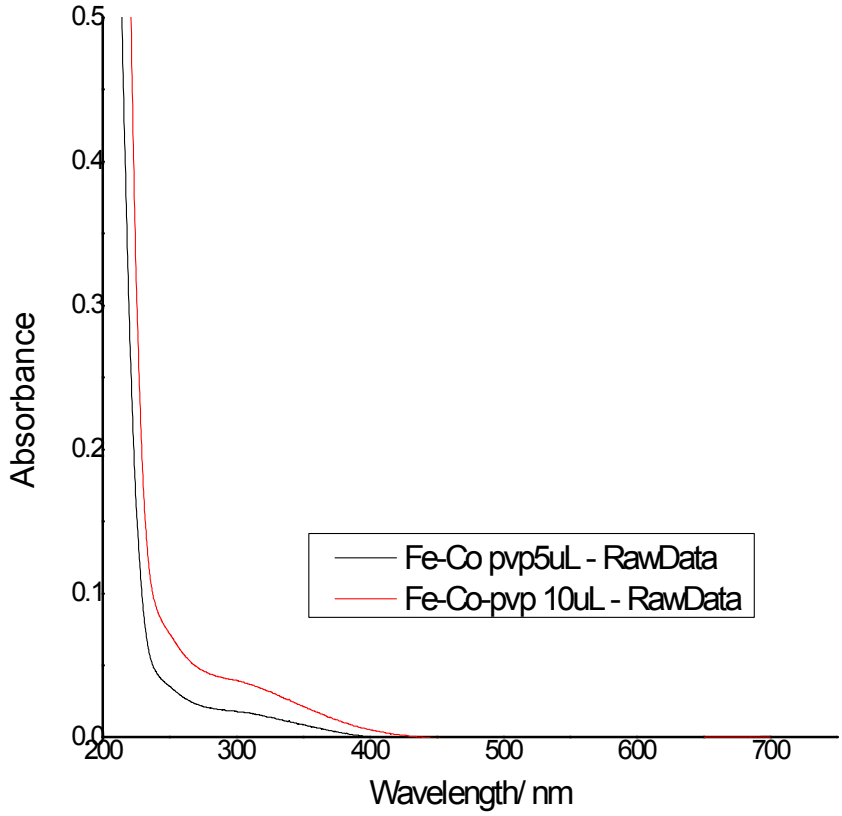


Figure 4.2 UV Graph

Figure 4.2 shows UV graph of Fe Co. Red curve represents Fe Co in 10ul of PVP. Black cure represents Fe Co in 5ul of PVP. We can see that absorbance is both cases are decreasing exponentially with increase in wavelength. At wavelength of 250nm Fe Co PVP 5ul. Is decreasing and become 0 to 400nm. In UV Graph Showing Blue shift absorption.

Characterization of Bimetallic Nano-Particles From TEM.

Transmission electron microscopy is a microscopy technique in which a beam of electrons is transmitted through a specimen to form an image. Transmission electron microscopes are capable of imaging at a significantly higher resolution than light microscopes, owing to the smaller de Broglie wavelength of electrons. This enables the instrument to capture fine detail even as small as a single column of atoms, which is thousands of times smaller than a resolvable object seen in a light microscope. Transmission electron microscopy is a major analytical method in the physical, chemical and biological sciences.

Spectroscopic techniques can only give averaged results in a whole sample that is always not the case for bimetallic NMs. So to obtain fruitful crystal and electronic structure information of a nanoparticle, more efficient techniques, by which combined high resolution microscopy and spectroscopy can be performed simultaneously at ultra-high resolutions, are required. Traditional TEM based techniques have also been widely used in bimetallic NMs research.

Compared with magnetic metals, noble metals have more profound electron structures, exhibiting irreplaceable advantages in the areas of catalysis and optical detection based on the Surface Plasmon Resonance (SPR). It is of great scientific significance and applied value to combine them together to design new magnetic–noble multifunctional nanostructures, to discover their magnetic responses or catalytic activities and further study the relationship between the properties and the sizes, components and structures of bimetallic NMs.

TEM full material analysis and SEM only surface analysis. TEM is based on transmission of Electron Principle. TEM has high resolution. TEM is used to analyse structure defects (like Grain Boundaries, Precipitation, and Dislocation).

FESEM is the abbreviation of Field Emission Scanning Electron Microscope. A FESEM is microscope that works with electrons (particles with a negative charge) instead of light. These electrons are liberated by a field emission source. The object is scanned by electrons according to a zig-zag pattern.

4.2.1Bimetallic Nanoparticles Cobalt, Manganese Sulphateof TEM image.

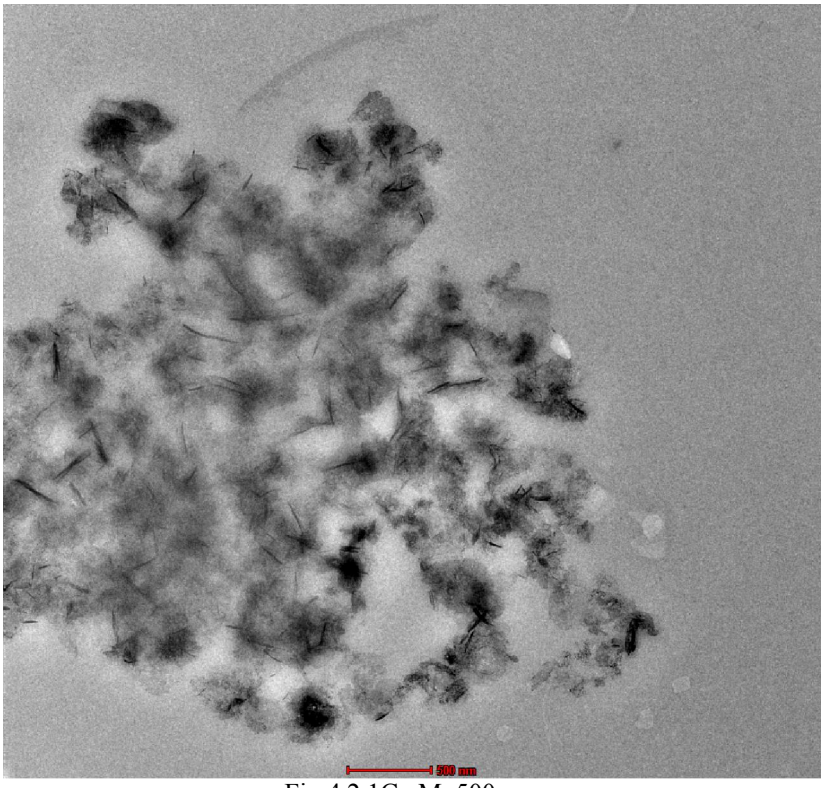


Fig 4.2.1Co Mn500 nm

Figure 4.2.1 TEM image for CoMn (500nm) Figure 4.2.1 shows TEM image for the sample of CoMn. Here we can see that CoMn nanoparticles are in the size of 500nm. and Surface Morphology and Non Homogeneous.

Slice	Count	Total Area	Average Size
Co-MN 500nm.tif	16251	8544281	100-150nm

4.2.2Bimetallic Nanoparticles Ferric Nitrate, Cobalt of TEM image.

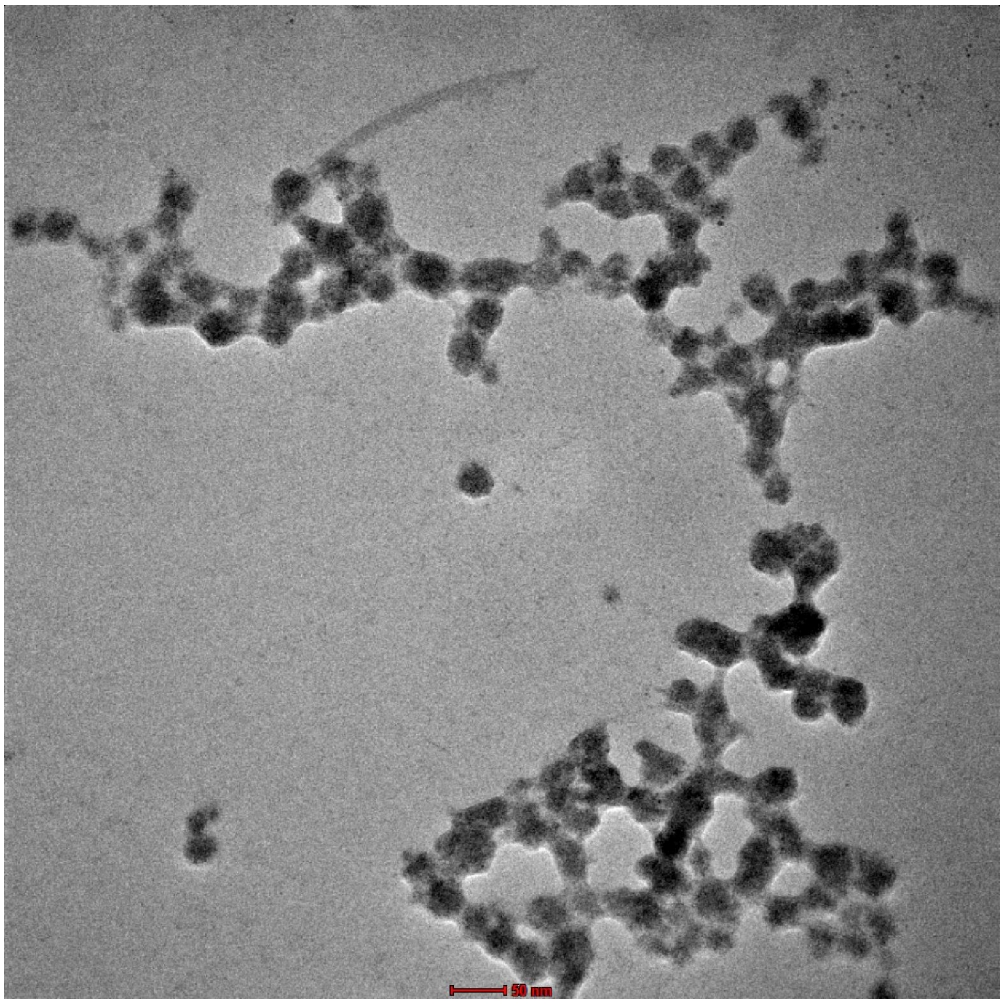


Figure 4.2.2 Fe Co 50nm

Figure 4.2.2 TEM image for FeCo (50nm) Figure 4.2.2 shows TEM image for the sample of Fe Co. Here we can see that Fe Co Nanoparticles are in the size of 50nm. And we can see the non-Homogeneous And Surface Morphology.

Slice	Count	Total Area	Average Size
Fe-Co 50nm.tif	1151	115532.9	40-50nm

4.2.3 Bimetallic Nanoparticles Ferric Nitrate, Manganese Sulphate of TEM image.

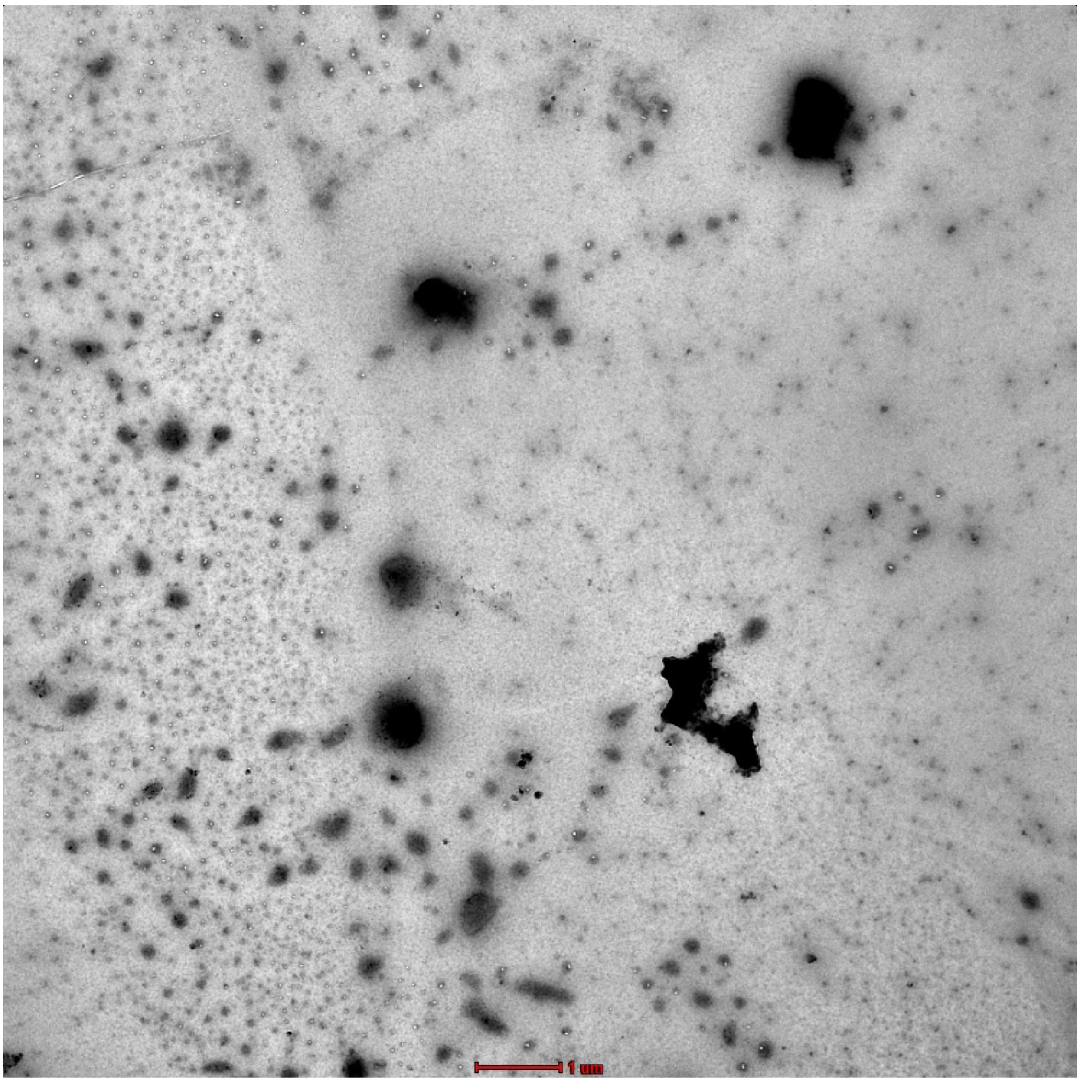


Figure 4.2.3 Fe-MN 1 um

Figure 4.2.3 TEM image for FeMn (1um) Figure 4.2.3 shows TEM image for the sample of Fe Mn. Here we can see that Fe Mn Nanoparticles are in the size of 1um. And we can see the non-Homogeneous And Surface Morphology.

Slice	Count	Total Area	Average Size
Fe-MN 1um.tif	10415	30.83	150-200nm

4.2.4 Bimetallic Nanoparticles Ferric Nitrate, Cobalt of TEM image.

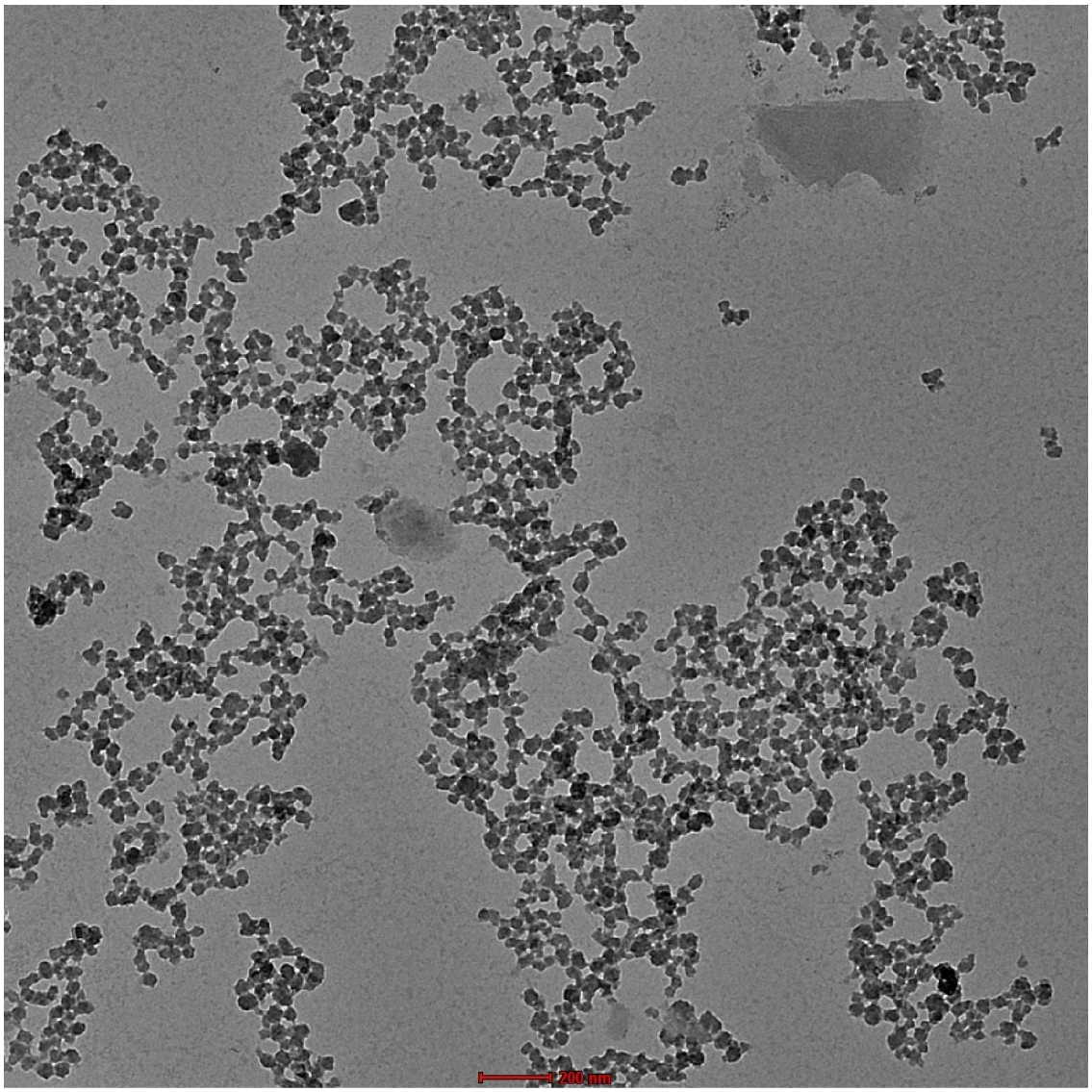


Figure 4.2.4 Fe Co 200nm

Figure 4.2.4 TEM image for Fe Co (200nm) Figure 4.2.4 shows TEM image for the sample of Fe Co. Here we can see that Fe Co Nanoparticles are in the size of 200nm. And Surface Morphology And Homogeneous Structure.

Slice	Count	Total Area	Average Size
Fe-Co 200nm.tif	2353	2863767	20-30nm

4.2.5 Bimetallic Nanoparticles Ferric Nitrate, Manganese Sulphate of TEM image.

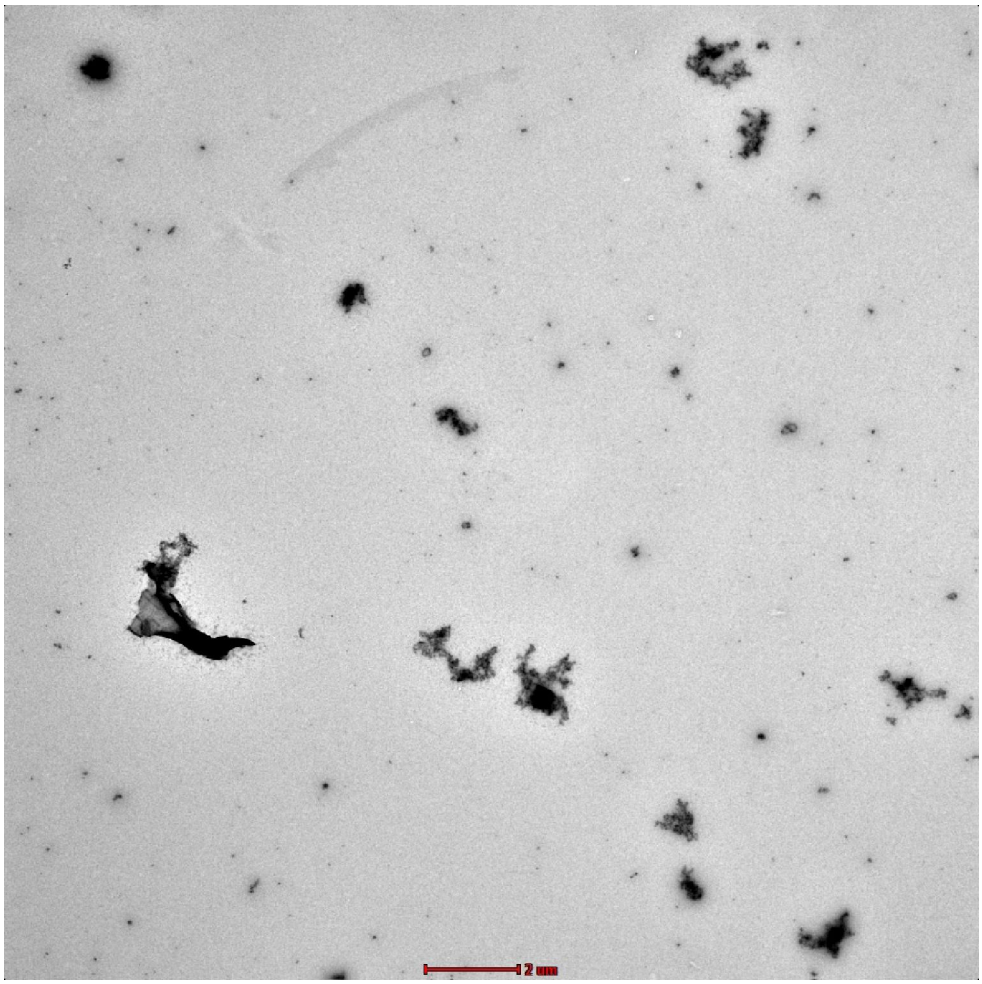


Figure 4.2.5 FeMn-2um

Figure 4.2.5 TEM image for FeMn (2um) Figure 4.2.5 shows TEM image for the sample of Fe Mn. Here we can see that FeMn nanoparticles are in the size of 2um. and Surface Morphology and Non Homogeneous structure.

Slice	Count	Total Area	Average Size
Fe-Mn 2um.tif	19521	35.012	35-40

Applications of nanoparticles

Nanoparticles synthesized by the various methods have been used in diverse in vitro diagnostic applications [38]. Both gold and silver nanoparticles have been commonly found to have broad spectrum antimicrobial activity against human and animal pathogens. Silver nanoparticles are already widely used as antimicrobial agents in commercial medical and consumer products. Show's the general applications of metal nanoparticles in biological field.

Magnetic storage

Magnetic NMs exhibit great potential applications such as magnetic data storage, microwave absorption, magnetic fluid and biomedicine. The performances of magnetic NMs are critically dependent on their magnetic features, containing temperature dependent blocking temperature, field dependent coercively and saturation magnetization. For bimetallic system, the magnetic property is strongly dependent on the interparticle and intraparticle interaction, which can be controlled by their elements type, ratio, distribution and their geometry architecture [39].

- Magnetic based drives, for example:- Hard disk. Floppy Disk. Magnetic tape.
- Optical based drives, for example:- CD drive (ROM and RW) DVD drive (RPM and RW).
- Flash or solid state chip based drives, for example:- USB drive. SD cards.

5.2Storage Systems

As overall storage demand keeps growing (largely due to growing amount of digital data stored

on Internet but also due to improvements in storage cost and capacity), the storage and archival libraries are facing complex real-time storage management issues. Some of these issues are traditional enterprise storage issues such as scalability, reliability, and performance that have been successfully addressed with arrays of hard disk drives. Recently, due to the increased cost of energy and related environmental issues, much emphasis has been placed on the energy efficiency of storage, which has led to new categories of storage subsystems [such as massive arrays of idle disks (MAID)]. On the other side, due to the progressively larger amount of private information being placed either on portable computers or on internet portal servers, data security (and, in particular, data at rest security) is also becoming one of the important required features of both individual disk drives and overall storage systems. Finally, the emergence of Si flashbased memories and solid-state drives allows for interesting novel storage architectures, both on the single drive level (such as hybrid disk drive) and on the storage system level, where Si flash plays the role of the fast, non-volatile cache memory that improves overall system performance [40].

- **Hard Drive**

Most computer hard drives are magnetic, even today in 2010. The hard drive is where the computer's operating system and programs are stored. Without the hard drive, the computer would have to run off a disk that held not only the operating system, but any other programs that were needed. Running everything from a disk other than the hard drive will slow the entire system down.

- Floppy Disk

The original floppy disk was floppy and flimsy in texture. During the evolution of the floppy disk, they went from 80 kilobytes of storage up to 2880 kilobytes of storage (2.88 megabytes). The most known floppy drives are the 5 1/4-inch 720 kilobyte disk and the 3 1/2-inch 1.44 megabyte disk.

- **Tape**

Magnetic tape drives have been in use longer than floppies. Primarily used for back up storage, the tape drive has been a must in the corporate world. Tape drives are now capable of backing up to 3 terabytes of information.

- **Iomega**

Iomega has made several types of magnetic storage devices. The most popular were the Zip and Jazz drives, however Peerless was another drive made. These drives opened up storage in the capacities from 40 megabytes up to 20 gigabytes are very similar to floppy disks. Again they are plastic discs coated with magnetic material. The difference between them is that zip disks can **store** much more. The one shown stores 100MB and you can get them up to 250MB.

- **Zip Drive or Superdisks**

- **Magnetic Tape**

Made of a long plastic strip coated with magnetic material, tape is mostly used for making backups. It can store lots of data, but this data is slower to access, because of having to wind through to the information you need slows down he access time. This makes it **impractical for use as main storage. One great advantage of magnetic tape is its cheapness.**

Conclusion

Nano Particles are particles between 1 and 100 nanometres in size with a surrounding interfacial layer. In this project using microwave irradiation. Nano Particlespossess the potential in serving as materials for dye-sensitized magnetic storage devices. There are different types of synthesis methods Microwave irradiation of Nano Particles is and low-cost method to synthesize Nano Particles. TEM image size of Fe-MN (2um) average size of particles 40nm Or Fe-Co (200nm) average particles size of 30nm Or Fe-MN (1um) average size of particles 200nm And Co-MN (500nm) average size of particles 50nm. FeCo 200nm ideal Particles they give Homogeneous structure And Other Non-Homogeneous Structure. On UV Characterization Got SPR. They Shift Blue Wavelength. it's Means Nanoparticles existing.

Nano Particles have good electronics as well as optical properties. Bimetallic Nano Particles mainly magnetic storage. TEM Can show Characterization like -Morphology, Crystallization, Stress, and Magnetic Domain. TEM –Full Material Analysis while SEM –Only Surface Analysis. TEM is Based on transmission electron based Principle. TEM has high Resolution. TEM is Use to Analysis Structure- Grain Boundaries, Precipitation, and Dislocation. UV-Ultraviolet-visible spectroscopy is one of the more ubiquitous analytical and characterization techniques in science. Metals- In which d-Shell Outermost ElectronFor metallic Elements fasters exited.

As we known, Magnetic Storage Devices are widely used for data storage in our digital world these days. By approaching towards Nano scale technology, advancements in the field of magnetic storage can be made. Characteristics and features of these types of storage devicelike, speed for data transfer, storage capacity etc. can be enhanced.

A **hard disk drive (HDD)**, **hard disk**, **hard drive** or **fixed disk** is an electromechanical data storage device that uses magnetic storage to store and retrieve digital information using one or more rigid rapidly rotating disks (platters) coated with magnetic material. The platters are paired with magnetic heads, usually arranged on a moving actuator arm, which read and write data to the platter surfaces.

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