

Shweta Sharma
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Experience:

Worked as Project Assistant in **CSIO Chandigarh** from Jan.2003 till Jan. 2005 for a period of 2 years in the field of Materials Science R&D. Previously I have worked as Project Trainee in the same organization for a period of 7 months from July 2002 to Jan. 2003.

Objective:

To contribute my skills and knowledge to a research team doing leading edge development in the field of **Synthesis and characterization of Nano-Materials, Materials Science and Physics.**

Educational Qualification:

M. Tech. (Materials science) from Barkatullah University, Bhopal securing 76% marks, in January 2003.

M. Sc. (Physics) specialization in Electronics from Barkatullah University, Bhopal securing 74% marks, in 2001.

Achievements:

Papers Published:

1. **“Characterization of transition metal oxide ceramic material for continuous thermocouple and its use as NTC fire wire sensor ”** M.L.Singla, [Shweta Sharma](#), Baldev Raj, and V.R Harchekar in **“Sensors and Actuators A”**. *Available online 25 January 2005.*
2. **“Detection of water core in Indian red delicious and golden apples”** M L Singla, S.C Jain, [Shweta Sharma](#) and S.K Angra communicated in **“Journal of Applied Horticulture”**.

Skills:

- 2 years of experience in the field of **Characterization of Nanomaterials.**
- Languages: **C,C++**
- Experience and skills to take independent responsibility as well as the ability to be a productive team leader.

Work Experience:

1. Development of Thermal sensor using NTC Ceramic Materials:

Centre for Scientific Instruments Organization (CSIO), CSIR, Chandigarh

Numbers of ceramic mixtures with oxides of manganese as main constituents were made and their characteristics were studied. Analysis and X-Ray diffraction studies were carried out, results revealed the formation of various structures of manganese oxide. The change of resistance with temperature was studied and it was found that the resistance changes from Mega ohms at room temperature to about 100 ohms at 350°C when the ceramic mixture contains 5% Lanthanum and 95% Mn₃O₄, demonstrating NTC behaviour. There is almost 40% drop in resistance with every 20-degree rise in temperature. Different techniques were adopted for filling the sensor tubes. Paste of ceramic material using specific solvents was made and was filled in the tubes by specially designed extruder gun. Sensing wires were forced through the tube to move along with paste, constant distance between the wires and sheath was maintained by using a floating mandrel and in this way the 10 feet long pipes were filled. Change in resistance, change in voltage and response time were determined in furnace as well as by a flame test.

Responsibilities:

1. Study of the transition metal oxides
2. Characterization of transition metal oxides ceramic material
3. X-ray Diffraction analysis
4. Scanning Electron Microscope (SEM) result analysis
5. Resistance Temperature (RT) Measurement using Two Probe Method.
6. Published paper on the same.

2. Advanced off line and On-line Measurement System for Quality Assessment of Agri-produce

Centre for Scientific Instruments Organization (CSIO), CSIR, Chandigarh

A transmittance modulation based electro-optic technique is investigated and established for off-line monitoring of the water core in apples and consistent results obtained. The method is based on the principle of measuring the optical density of the sample at two selected wavelengths and computing the optical density difference. The system consists of a high intensity tungsten halogen lamp as light source. A set of interference filters, mounted on filter wheel is used to isolate the desired wavelengths. An electromechanical chopper along with a kinematically engineered totally light proof sample compartment, designed to reduce multiple reflections is used to modulate the beam and to generate reference signal. Silicon (Si) photodiode with required sensitivity in visible to near infrared region is used for detection. It is mounted in such a way that it receives all the transmitted radiations from the sample. In this system light emitted from the source is collimated and passed through interference filters. Different wavelengths pass through electromechanical chopper which modulates the signals and produces a signal of reference frequency. Modulated signal is transmitted through the sample (apple), and is focused on to the detector. The signal from the detector and signal of reference frequency generated by chopper is fed to the Lock-in amplifier. Lock-in technique is used to lock the modulated signal at reference frequency to eliminate dc and other frequencies to improve S/N ratio. The lock-in amplifier displays the signal in terms of transmittance at different wavelengths, which has been calculated as absorbance for respective wavelengths. The experiment has been conducted on two varieties of apples golden and red delicious. The study was undertaken for 100 apples of each variety.

The comparative study of water core in apples has set a new precedent to apply electro optic techniques for quality evaluation of agriculture products. In general horticultural products have been considered to be opaque. These experiments demonstrated that light interacts with the body of a material and not just with the surface. The plots of absorbance (optical density) versus wavelength for two varieties of apples at different time interval over a period of two months have

been taken and more absorbance at 760nm than at 810nm has been observed. The absorbance at 810nm goes on decreasing with time for 40 days in case of golden apples and then there is no much change in these values at longer storage. This indicates that water core level initially decreases with time in case of golden yellow apples and then there is abrupt change and becomes nearly constant, indicating there by that these fruits are no longer useful for consumption purpose due to loss of sweetness inside. In case of red delicious apples the same thing happens but takes a little longer time as that of golden delicious apples and there fore can be stored for longer time compared to golden apples. The average water core index calculated from these data for two respective wavelengths 760nm and 810nm showed that the golden apples are more prone to water core than the red delicious apples, therefore the red delicious apples are more suitable for longer storage than golden apples.

Responsibilities:

1. Define and measure the optical and other properties of fruits and vegetable and their functional relationship to quality and establish a database of these properties.
2. Development of off line Measurement system for quality attribute of fruits

3. Structural and Photoluminescence Properties of NANOCRYSTALLINE Cadmium Sulphide films:

Barkatullah University, Bhopal

Numbers of deposition techniques have been utilized to obtain solar cell quality layers of Cadmium Sulphide, films are prepared by Chemical Vapour Deposition (CVD) technique, and characterized for its structural and photoluminescence properties by X-Ray Diffraction (XRD) and U-V Visible Spectrophotometer. The XRD spectra's for CdS nanocrystalline film of two different particle sizes is analyzed and the results are compared with results of CdS Poly Crystalline film. The particle size is calculated by Schreerer's formula. The XRD data revealed a number of peaks corresponding to ITO base layer and CdS. Absorbance for two nanocrystalline films of different particle sizes and polycrystalline films is observed by using U-V Visible Spectrophotometer and the energy band gap is calculated at different wavelengths. Comparing the results of nanocrystalline films with polycrystalline films we observed a shift and this shift of fundamental edge is towards the lower side. Hence there is a blue shift in the absorption edges of nanocrystalline film.

It is concluded that good quality films can be grown over a wide range of Cadmium and Sulphide Cd:S ratio. Best results are obtained at a Cd: S ratio of 1:5, at which the films also exhibit the best structural properties.

Responsibilities:

1. Preparation and characterization of thin films.
2. X-ray Diffraction analysis
3. Optical Characterization.

4. Rietveld analysis of X-Ray Powder Diffraction pattern:

Structural characterization of Zinc Selenide (ZnSe) films has been carried out by Rietveld analysis, software used for structure determination. The XRD spectra for ZnSe bulk and nano crystalline films are analyzed for the structure determination; observed structural data carried out for bulk and Nano powder samples of ZnSe and corresponding JCPDS for the films are compared in the Rietveld refinement analysis, parallel parameters are varied. By varying the parameters we are able to fit the Rietveld profile over the XRD profiles of ZnSe bulk and nano crystalline samples for the near value of accuracy. It is observed that the non-uniform strain comes out to be negative indicating compressive stress in the nanocrystalline samples. Also from the crystal structures of bulk and nano ZnSe samples a decrease in bond length for the nano samples is observed, specifies the presence of compressive stress. The calculated 'Goodness of fit' parameter for bulk and nano ZnSe showed that the curves fit to near accuracy

Responsibilities:

1. Preparation and characterization of thin films.
2. X-ray Diffraction analysis
3. Rietveld Analysis (Particle size calculations and strain measurements for bulk and nano ZnSe)

Subjects & Areas of Interest:

1. Structural Properties of materials.
2. Polymer Science
3. Measurement Science and Technology
4. Measurement and characterization of materials
5. Ceramics and composites
6. Novel materials
7. Solid State Physics
8. Microprocessors
9. Nuclear Physics