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##### **Nanomaterials and their Characterization**

Characterization of Nanomaterials using UV-Visible Absorption spectroscopy, Fourier transform Infra-red spectroscopy, Transmission electron microscopy (TEM), Scanning Electron Microscopy and FESEM etc.

##### **Practical component –**

1. Experimental demonstration of the synthesis of various types of polymers (like nylon, rayon fibre/ artificial silk etc.)
2. Molecular dynamics simulation of small molecules like water using softwares like LAAMPS
3. Demonstration of different experiments for determination of hardness of water
4. Interpretation and analysis of experimental data/ figures of various structures (biomolecules, and nano-structures) from some already published research papers/ reviews for understanding various spectroscopic and physicochemical techniques

##### **Essential/recommended readings**

1. Engineering Materials: Polymers, Ceramics and Composites, 2nd ed. Kindle Edition by A.K. Bhargava
2. Engineering Chemistry by O.G. Palanna, McGraw Hill, 2017.
3. Water Treatment (Hardness of Water) by Subodh Bhandarkar
4. Materials Science and Engineering: An Introduction, by Callister, 8th Edition, John Wiley and sons inc., Jan 2010.
5. Plastics Materials, Newness, Butterworths and Brydson, J.A., London, 1975
6. Spectroscopy and Characterization of Nanomaterials and Novel Materials: Experiments, Modelling, Simulations, and Applications, by Prabhakar Misra
7. Optical Properties and Spectroscopy of Nanomaterials, 2009 by Jin Zhong Zhang





