

212049 – RAMAN SPECTROSCOPY - Fundamentals and Applications

CREDITS: 04 (four) – 60 hours/class

CONTENT:

Phenomenon of light scattering. Incoherent inelastic scattering treatment of light: classical and quantum. Resonance Raman scattering: fundamentals and applications. Applications of Raman spectroscopy: materials, analytical chemistry, biochemistry, etc.

SYLLABUS:

1. Discussion about the light scattering phenomenon.
2. Introduction to the theoretical treatments of Raman and Rayleigh scattering.
3. Classical theory of Raman and Rayleigh scattering.
4. Quantum theory of Raman and Rayleigh scattering.
5. Vibrational resonance Raman scattering: treatment by the perturbation theory.
6. Time-dependent formulation of resonance Raman scattering.
7. Ro-vibrational, rotational and electronic resonance Raman.
8. Applications of normal Raman and resonance Raman technique in materials science, analytical chemistry, artistic conservation, etc.

BIBLIOGRAPHY:

1. LONG, Derek. A. The Raman effect: a unified treatment of the theory of Raman scattering by molecules. John Wiley & Sons, Chichester, 2002.
2. FERRARO, John R.; NAKAMOTO, Kazuo; BROWN, Chris W. Introductory Raman spectroscopy. 2.ed. Academic Press, 2003.
3. LEWIS, Ian R.; EDWARDS, Howell G. M. Handbook of Raman spectroscopy: from the research laboratory to the process line. Marcel Dekker, New York, 2001.
4. MAYO, Dana W.; MILLER, Foil A.; HANNAH, R. W. Course notes on the interpretation of infrared and Raman spectra. John Wiley & Sons, Hoboken, 2004.
5. Scientific literature articles to be discussed in class.