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Raman Spectroscopy

Raman Spectroscopy is a powerful characterization technique that can be used to obtain information about the structure and properties of solids and molecules from their vibrational transitions. This technique relies on inelastic scattering, i.e. Raman scattering, of monochromatic light. Vibrational motion in a system, such as phonons, involves a change in polarizability. The interaction between the polarizability with incoming photons creates an induced dipole moment which emits radiation that contains the observed Raman scattering. The energy shift of the scattered photons with respect to the incident ones can be used to obtain information about crystalline symmetries and preferred orientations in a material, phase transitions, remanent stresses and/or strains, among others. In this work, the basics of Raman Spectroscopy will be presented, followed by a description of the equipment normally used in laboratories. Afterwards, a novel technique called “Femtosecond stimulated Raman spectroscopy” will be introduced and some examples and data analysis in oxide materials will be made.