It has been known for several tens of years that many microorganisms can form intracellular crystal inclusions. One of these crystal inclusions groups consists of microcrystals of barite ($BaSO_4$) and celestine ($SrSO_4$), which occur in some freshwater and marine microorganisms. Their function and, in general, the way of their formation is not completely clarified, despite several hypotheses. Another interesting group of intracellular crystal inclusions are complexes of some divalent cations with phosphates, for example, pyrophosphate, which plays an important role in the energy cycle of cells. This diploma thesis aims to prepare a series of microcrystals of barium and strontium, with different stoichiometric ratios, with sulphates and phosphates and their subsequent analysis using confocal Raman spectroscopy. The analysis of these spectra will subsequently serve for the qualitative characterization of crystal inclusions in living cells.