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Development of Raman spectroscopy technique for analysis of kidney stones

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Raman spectroscopic studies of the composition of urinary calculi using the spectra of different chemical components were reported in literature before. According to previous studies, it is cleared that by analyzing Raman spectra of human urinary stones, the chemical compositions of calcium oxalate, calcium phosphate, struvite and uric acid can be identified. For Raman applications the state art laser sources are fundamental (1064 nm) and harmonics wavelengths (532, 355 and 266 nm) of Nd:YAG laser. A promising application of Raman spectroscopy is the analysis of stones like kidney stones, uric acid stones, gall stones, (calcium oxalate monohydrate, cholesterol, black pigment stones and mixed stones). By investigating the exact stone composition, the most suitable treatment method can be derived. In this work, Raman spectroscopy system consisting of a high resolution spectrometer and a nanosecond-pulse Nd:YAG third harmonic laser was developed and used in analysis of kidney stones. The results are important in understanding kidney stone formation processes, which can lead to preventive therapeutic strategies and treatment methods for urological patients.

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