

# Surface mapping by laser assisted plasma spectrometry

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This study is focused on urinary stones. The distribution of major, minor and trace elements in urinary stones can provide information on their formation. Therefore, analytical methods, which can map the distribution of these elements, should be used. The most common methods include Laser-Induced Breakdown Spectroscopy (LIBS) and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS).

Investigated urinary stones were cut, sealed into a resin and the cross-section of the sample was polished and was mapped by laser-ablation based analytical methods. On the base of these measurements the correlation between calcium and carbon distribution for samples containing whewellite or weddellite (or both of these minerals) was confirmed. The correlation between magnesium and phosphorus can be attributed to the presence of struvite. The correlation between calcium and phosphorus distribution indicates the presence of apatite. Quantification of laser ablation based methods is still very problematic and these methods are often used only for qualitative elemental mapping. There are no commercially available standards, which would correspond to urinary calculi matrix. Internal standardization is also difficult, mainly due to different crystalline phases in one kidney stone. For this study the calibration pellets were prepared from human urinary calculi with phosphate, oxalate and urate matrix. For this comparative study the most frequently used laser-ablation based analytical techniques were chosen, such as LIBS and LA-ICP-MS. Moreover some unconventional techniques such as simultaneous LIBS – LA-ICP-OES and laser ablation (LA) – LIBS were also utilized.