

Advanced Chemical Imaging using Laser Ablation Inductively Coupled Plasma Mass Spectrometry

Abstract

The work presented in this doctoral thesis describes in detail the rationale, development and end use of the LA-sp-ICP-MS technique. A robust algorithm was developed for data processing, which enabled the handling of huge amounts of data in practical time frames. By simulating the whole process from ablation to NP detection *in silico*, it was possible to optimize a number of parameters that can affect the quality of the final results. The problem of presenting the results of this complex data processing is solved by developing a stand-alone application that could display multimodal results in an insightful way. Finally, the critical limitation of laser-induced NP degradation was examined in detail, covering this previously unresolved issue in the simulation model and thus consolidating the technique on a good theoretical foundation.