Simultaneous Laser Ablation Molecular Isotopic Spectrometry (LAMIS), Laser-Induced Breakdown Spectroscopy (LIBS) and Laser Ablation Inductively Coupled Plasma Spectrometry (LA-ICP-MS) for elemental analysis of geological samples

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A system that combines the capabilities and analytical benefits of LIBS, LAMIS and LA-ICP-MS was demonstrated for the analysis of samples of geological interest. The system consists of a Nd:YAG laser operated at 213 nm, for the LIBS and LAMIS measurements with a switchable spectrometer-detector system (Czerny-turner spectrograph with ICCD detection and a six channel spectrograph with CCD detection). For ICP-MS measurements a choice between a Quadrupole based system and Time-Of-Flight based system was made depending on the application. The data will show simultaneous determination of major elements such Si, Ca, Mg, C, Al, etc. with LIBS, carbon and boron isotopes determination by LAMIS, with trace composition (i.e., REE's) information from these geological samples by ICP-MS. The data are presented in the form of elemental distribution maps of major and trace elements with lateral resolution on the order of 50 μm.

The effect of Copper in the oxidation of Fe(II) in seawater

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The competition between Fe(II) and copper species has been studied in seawater at different initial Cu(II) and Cu(I) concentration (0-200nM). In addition, the effect of pH (6.2-8.5), bicarbonate concentration (2-9mM) and hydrogen peroxide concentration (0-500nM) on the Fe(II) rate constant were also studied. The Cu(II) added in solution was rapidly reduced to Cu(I), at the first 1-2 min, and it remained in solution after 40 min when Fe(II) was added. The initial copper additions increase the oxidation rate of Fe(II) under the different experimental conditions. The rate constant of Fe(II) was a second order pH dependent function at pH over 7.5 and a first order function for lower pH values. In the presence of Cu(II), a first-order pH dependence was always observed. Thus, $FeOH^+$, $FeCO_3$ and probably $FeHCO_3^+$ are involved in the process. In addition, Fe(II) oxidation rate was increased only when both carbonate and Cu(II) concentrations was over 6mM and 100nM, respectively. The effect of H_2O_2 concentrations was also function of the initial Cu(II) additions, but the oxidation rate was equally affected by H_2O_2, thus the observed effect must be only due to the presence of copper species in solution.

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