

## **Green and fast laser fusion technique for bulk silicate rock analysis by laser ablation-inductively coupled plasma mass spectrometry**

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Sample preparation of whole-rock powders is the major limitation for their accurate and precise elemental analysis by laser ablation inductively-coupled plasma mass spectrometry (ICPMS). In this study, a green, efficient, and simplified fusion technique using a high energy infrared laser was developed for major and trace elemental analysis. Fusion takes only tens of milliseconds for each sample. Compared to the pressed pellet sample preparation, the analytical precision of the developed laser fusion technique is higher by an order of magnitude for most elements in granodiorite GSP-2. Analytical results obtained for five USGS reference materials (ranging from mafic to intermediate to felsic) using the laser fusion technique generally agree with recommended values with discrepancies of less than 10% for most elements. However, high losses (20–70%) of highly volatile elements (Zn and Pb) and the transition metal Cu are observed. The achieved precision is within 5% for major elements and within 15% for most trace elements. Direct laser fusion of rock powders is a green and notably simple method to obtain homogeneous samples, which will significantly accelerate the application of laser ablation ICPMS for whole-rock sample analysis.

**Key words:** Sample preparation, LA-ICP-MS, Elemental analysis, Laser fusion