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激光熔蚀微量氧同位素分析方法及其地质应用 [点此下载全文](#)

[高建飞](#) [丁梯平](#)

中国地质科学院矿产资源研究所,北京,100037;国土资源部同位素地质重点实验室,北京,100037

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摘要:

研究小尺度或微区的同位素组成变化已成为地球化学分析技术发展的重要方向之一。在研制CO₂激光熔蚀氧同位素制样装置的基础上,通过该装置与MAT 253质谱计联机实现了硅酸盐和氧化物矿物的氧同位素在线分析。所测样品包括NBS 28石英标样、石英玻璃,以及天然的石榴子石、锆石、橄榄石等一些难熔矿物。该装置分析的颗粒样品氧同位素分析精度为±0.22%,最低样品量为8μmol的O₂;石英玻璃原位分析的氧同位素分析精度为±0.35%,最低样品量为7μmol的O₂。这种装置和分析方法具备速度快,熔样温度高的特点,尤其适于难熔矿物。该装置可采用脉冲激光实现石英玻璃的微区原位分析,可应用于单个矿物生成环带的氧同位素研究。

关键词: [激光熔蚀](#) [BrF₅法氧同位素分析](#) [硅酸盐和氧化物](#)

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Fund Project:Laser Microprobe Oxygen Isotope Analysis Method and Geology Applications

Abstract:

The determination of isotopic composition in trace amount has become one of the major directions of development of isotopic measurements. A laser extraction system has been assembled successfully and combined with MAT 253 mass spectrometer to form a laser analytical system in this study. And the method of analyzing oxygen isotope of silicates and oxides was development. Research objects are some typical eutexia and refractory minerals, including international standard material NBS 28, quartz glass, garnet, zircon and olivine, focusing on the homogeneity and variation of oxygen isotopic composition in trace amount. The analytical precision of particle samples is ±0.22%, and its oxygen contents for analysis are reduced to 8μMol. The analytical precision of in situ quartz glass is ±0.35%, and its oxygen contents for analysis are reduced to 7μMol. With this method, we can analyze very small amounts of materials with high spatial resolution, and it is also characterized by fast analytical rate and high melt temperature, especially for refractory minerals. The method can be used to investigate oxygen isotope zonation, trace amount variations on oxygen isotopic composition and oxygen isotope geochemistry in single mineral, and shows great applications about natural minerals, rocks and mantle inclusions forming conditions and the origin.

Keywords:[microprobe analysis](#) [oxygen isotope](#) [silicates and oxides](#)

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