

**LETTER**

**AMORPHOUS MATERIALS: PROPERTIES, STRUCTURE, AND DURABILITY**

**Competition between two redox states in silicate melts: An in-situ experiment at the Fe *K*-edge and Eu *L*<sub>3</sub>-edge†**

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**ABSTRACT**

The understanding of redox equilibria as well as the knowledge of the elemental distribution in magmatic melts are of fundamental importance to constrain the genesis of magmas. In particular, the partitioning of trace elements (e.g., Eu) has demonstrated to be a useful tool for estimating the redox conditions in Earth and planetary materials. However, for a more complete comprehension of Eu in silicate melts, information regarding the effects of temperature (*T*), redox conditions, compositions, and the possible interference of other multivalent elements is still lacking. Here we provide new data on the oxidation states of two commonly coexistent multivalent elements (Eu and Fe) in melts, acquired by “in situ” dispersive X-ray absorption spectroscopy experiments at high temperatures and at different oxygen fugacity conditions. This work, for the first time, shows the possibility to monitor in real-time the behavior and valence variations of two elements under varying environmental conditions (like *T* and redox state).

**Keywords:** Europium, iron, oxidation states, silicate melts, in-situ dispersive XAS