*American Mineralogist, Volume 91, pages 1110–1116, 2006*

# Carbonate reduction by Fe-S-O melts at high pressure and high temperature

**SARAH C. GUNN AND ROBERT W. LUTH***

C.M. Scarfe Laboratory for Experimental Petrology, Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, Alberta T6G 2E3 Canada

## ABSTRACT

Diamond may form in the Earth's mantle by recrystallization of graphite, by precipitation from a C-bearing fluid, or by reduction of carbonate. The latter mechanism could result from interaction with a reduced fluid or another phase that would accommodate the oxygen produced by the reduction. One possible such phase is a sulfide-bearing melt, given that sulfides are common inclusions in diamond. Experiments at 1300 °C, 6 and 7.5 GPa successfully reduced magnesite in the presence of a eutectic-composition Fe-S-O melt. Although graphite rather than diamond was produced by this reduction, these experiments demonstrate that this mechanism is a viable mechanism for reducing carbonate to carbon in the Earth's mantle.

**Keywords:** Experimental petrology, high-pressure studies, igneous petrology, crystal synthesis