

IN SITU HTXRD OF SILICA DISPLACEMENT REACTIONS OF VARYING PARTICLE SIZES

Michael S. Haluska
Georgia Institute of Technology
771 Ferst Drive
Atlanta, GA 30332
mike.haluska@mse.gatech.edu

Phillip Graham
Georgia Institute of Technology
771 Ferst Drive
Atlanta, GA 30332
phillip.graham@mse.gatech.edu

Kenneth Sandhage
Georgia Institute of Technology
771 Ferst Drive
Atlanta, GA 30332
ken.sandhage@mse.gatech.edu

Robert L. Snyder
Georgia Institute of Technology
771 Ferst Drive
Atlanta, GA 30332
bob.snyder@mse.gatech.edu

The high temperature displacement reactions of SiO₂ spheres reacted with vapor forming Mg₂Si, TiF₄, and MnCl₂ were studied using high temperature x-ray diffraction (HTXRD) with the reactants sealed inside graphite reaction vessels. Enclosure of the sample within the graphite cell allows for containment of the vapor formed during the reaction. Use of molybdenum x-ray radiation allows a substantial portion of the beam to pass through the cell (~70%). HTXRD measurements show that complete conversion of SiO₂ to MgO occurs after approximately one hour at 700°C, and for SiO₂ to TiO₂ after approximately one hour at 300°C. Several different mono-sized SiO₂ particle distributions were used to evaluate the reaction mechanism