

LETTERS

MnSi₂O₅ with the titanite structure: A new high-pressure phase in the MnO-SiO₂ binary

THILO ARLT,^{1,*} THOMAS ARMBRUSTER,² PETER ULMER,³ AND TJERK PETERS¹

¹Mineralogisch-petrographisches Institut, Universität Bern, Baltzerstrasse 1, CH 3012 Bern, Switzerland

²Laboratorium für Chemische und Mineralogische Kristallographie, Universität Bern, Freiestrasse 3, CH 3012 Bern, Switzerland

³Institute for Mineralogy and Petrography, ETH-Zentrum, Sonneggstrasse 5, CH 8092 Zürich, Switzerland

ABSTRACT

Single crystals of MnSiO(SiO₄) with the titanite structure together with MnSiO₃ clinopyroxene were synthesized from a MnO-SiO₂ oxide mixture at 1000 °C and 9.2 GPa in a multi-anvil press. The crystal structure of MnSi₂O₅ [space group *C2/c*, *a* = 6.332(1) Å, *b* = 8.161(1) Å, *c* = 6.583(1) Å, *β* = 114.459(3)°, and *V* = 309.66 Å³] was refined at room temperature from single-crystal X-ray data to *R*₁ = 2.23%. The monoclinic MnSi₂O₅ phase has the titanite aristotype structure and is similar to the monoclinic Ca-analogue CaSi₂O₅. Si occurs in compressed octahedral coordination, replacing Ti in titanite, and in tetrahedral coordination as an orthosilicate group. Mn has a distorted sevenfold coordination with Mn-O distances between 2.086 and 2.365 Å.