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Single-crystal Fe-bearing sphalerite: synthesis, lattice parameter, thermal expansion coefficient and microhardness

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Abstract

© 2016, Springer-Verlag Berlin Heidelberg.Sphalerite crystals (Fe,Zn)S containing up to 56 mol% of FeS have been synthesized by gas transport method and in molten salts in the temperature range 340–780 °C at various sulfur fugacities. It is shown that lattice parameter of Fe-bearing sphalerite changes with temperature and composition (x, mol% FeS in sphalerite) according to parabolic equation: a±0.0004/Å=(5.4099±0.0008)+(5.82±0.36)·10-4·x+--4.7±0.6)·10-6·x2+(4.2±0.4)·10-5·(T-298.15K). This relationship is independent from synthesis temperature and sulfur fugacity. Temperature expansion coefficient is independent from temperature or composition of the sphalerite solid solution. It is shown that increase in Fe content of the synthesis charge leads to larger deviations between the target and real composition of the obtained crystals. Vickers microhardness of sphalerite increases in the composition range 0–1 mol% of FeS, has broad maximum in the range 1–5 mol% and decreases at higher Fe content.

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Keywords

Crystal growth, Lattice parameter, Microhardness, Sphalerite, Thermal expansion coefficient

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