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Fe-O-Sn (Iron-Oxygen-Tin)

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The early results on this ternary system were reviewed by [1989Rag], who presented two isothermal sections at 800 and 475 °C from the studies of [1984Pan] and [1974Moh], respectively, with emphasis on the metal-rich region. Recently, [2004Han], during their investigations of the Fe-O-Sn-Zn quaternary system, determined the phase equilibria along the Fe_2O_3-SnO_2 join.

Binary Systems

The Fe-O phase diagram [1991Wri] exhibits the following compounds. Wustite (FeO) is a metal-deficient monoxide with the *B*1, NaCl-type cubic structure. Magnetite (Fe_3O_4) has the $H1_1$, Al_2MgO_4-type cubic structure. Hematite (αFe_2O_3) is $D5_1$-type rhombohedral. Other less-common polymorphic forms of the above compounds are known [1991Wri]. The Sn-O system [1974Moh] depicts three intermediate phases: SnO (tetragonal and orthorhombic forms, stable below 270 °C), Sn_3O_4 (triclinic; stable below 450 °C) and SnO_2 (Cassiterite; *C*4, rutile(TiO_2)-type tetragonal).

Ternary Phase Equilibria

With starting powders of Fe_2O_3 and SnO_2 (99.5+% purity), [2004Han] prepared pellets of powder mixtures and annealed them in air between 1400 and 1100 °C for 48-97 h, which were then cooled in air. The microstructures were examined with optical and scanning electron microscopy. The phase compositions were measured with electron probe microanalyzer. The projection of the phase boundaries on to the Fe_2O_3-SnO_2 join determined by [2004Han] is shown in Fig. 1. The new results, which show some disagreement with those found by [1966Cas], are to be preferred in view of the direct measurement of the phase compositions by electron probe microanalysis.

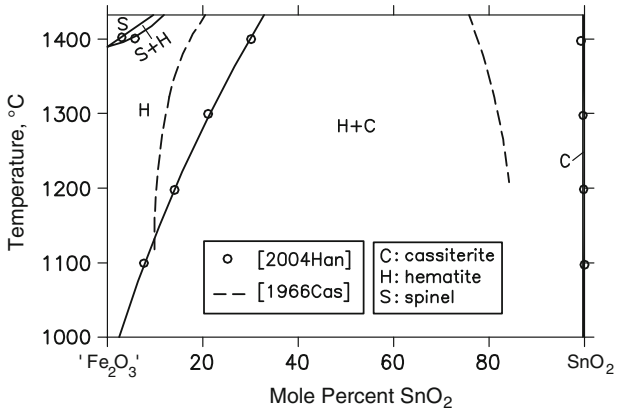

Fig. 1 Fe-O-Sn projection of phase equilibria in air on to the Fe_2O_3-SnO_2 join [2004Han]

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