Investigation of microstructure in hot-pressed Nb-23Ti-15Al alloy

Microstructure of hot-pressed Nb–23Ti–15Al alloy has been systematically investigated, with emphasis on the characterization of Ti(O, C) phase. The microstructure and composition of Nb–23Ti–15Al alloy were characterized using scanning electron microscopy (SEM), X-ray diffraction (XRD), transmission electron microscopy (TEM) and electron probe microanalysis (EPMA). The results indicate the presence of b, d and Ti(O, C) phases in the alloy. The b phase exhibits as large irregular blocks, while the d phase presents as small equiaxed particles linked together around b blocks. Ordering of b phase is shown by related selected area electronic diffraction (SAED) patterns and dark-field micrograph. The Ti(O, C), a solid-solution of TiO or TiC, is characterized for the first time in Nb–Ti–Al alloy. The Ti(O, C) has a face-centered cubic (FCC) structure and a moderate lattice parameter between that of TiO and TiC. Two different morphologies of Ti(O, C) are observed in the alloy: large cobblestone-like aggregated particles and small dispersive particles. The formation of Ti(O, C) phase can potentially increase high-temperature strength of Nb–Ti–Al alloy.

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