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Structure-property orientation relationship of a g/a2/Ti5Si3 in as-cast-45Al-2Nb-0.7Cr-0.3Si intermetallic alloy

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ABSTRACT:
Structure-property relationship of the as-cast g-Ti-45Al-2Nb-0.7Cr-0.3Si based intermetallic alloy was examined. The phases stable at room temperature in the alloy were g/a2/Ti5Si3, respectively; while their crystal structures were described by means of chemical formulas, Pearson's number, space groups, lattice parameters, atomic positions and occupancy numbers using a Vienna ab initio simulation package (VASP) software for materials design. Moreover, high resolution electron backscatter diffraction (HSEBSD) was used to analyse the orientation relationship of both the as-cast (b-solidifying) and heat-treated (a-solidifying) microstructural phases. The results showed that the formation of g/a2/Ti5Si3 follows the Blackburn orientation relationship (BOR): (b-solidifying) {110}b//{0001}a and <111>b//<2¯1¯10>a, and for (a-solidifying) ¼ (111)g jj (0001)a and <1¯10]g jj <11¯20>a.