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THE ELEVATED-TEMPERATURE CREEP AND FATIGUE BEHAVIOR OF B-MODIFIED Ti-6Al-4V

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Abstract

This work investigated the creep and fatigue behavior of boron-modified Ti-6Al-4V(wt.%) alloys processed using four processing routes: powder metallurgy (PM) rolling, PM extruding, ingot casting (IC), and IC extruding. The PM alloys exhibited microstructures containing equiaxed grains while the IC alloys contained alpha+beta lath microstructures. This enabled the PM alloys to achieve greater fatigue lives than the IC processed alloys. In both the PM extruded and IC extruded alloys, the TiB whiskers were aligned in the extrusion direction and the alpha-phase was also textured such that the basal plane was predominately oriented perpendicular to the extrusion axis. The fine equiaxed alpha-phase structure and the alpha- and TiB-phase texture were responsible for the significantly higher fatigue strength exhibited by the PM extruded alloy compared with all the other alloys. The reasons why the creep strength of the IC extruded alloys was superior to the other B-modified alloys will also be discussed.

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