MmeCa16-005

Exploring surface faceting in Ti-5553 alloy using in-situ high-temperature laser-scanning confocal microscopy.

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Surface faceting is a phenomenon related to the anisotropy in the surface energy of crystalline materials. It depends on the crystallographic orientation and occurs during annealing. This study reports on the surface faceting phenomenon observed during in-situ cooling of the metastable Beta Ti-5553 alloy. In-situ annealing experiments were conducted on the commercial Ti-5553 alloy. Disc samples were subjected to a high temperature of 1400 °C and then cooled down to 1000 °C using a High-Temperature Laser Scanning Confocal microscope. The analysis indicates that the surface faceting diffusion mechanism initiates at the grain boundary. Additionally, the crystallographic plane with highest atomic density in the Beta-BCC structure displays the mechanism variation following the ½<111> perfect dislocation motion, constituting cooperative atomic diffusion. The influence of crystallographic variables on surface faceting is discussed.