
Departmental Seminar

Seminar Title	: Effect of Post Annealing Heat Treatment on Microstructure, Texture and Mechanical Behaviour of Nb-10Hf-1Ti refractory alloy
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Venue	: M.Tech class room (MM 202E), MM Annex building
Date and Time	: 13 Jan 2025 (11:00 am)
Abstract	: The Nb-10Hf-1Ti alloy is a refractory alloy used in aerospace structural applications like expendable nozzles, and satellite thrusters. The sheet form of alloy Nb-10Hf-1Ti is extensively used to manufacture expendable nozzles of rockets using the process of metal spinning. This article investigates the effect of post-annealing heat treatment on the microstructure, texture, and mechanical behavior of Nb-10Hf-1Ti refractory alloy sheet of 6 mm thickness. The alloy was prepared by vacuum arc melting. The starting cold rolled plus vacuum annealed (1175°C for 9 h) sheet of 6 mm thickness has been studied for post-annealing heat treatment analysis. Post-annealing heat treatment was done in a vacuum (10 ⁻⁴ mbar) at three different temperatures i.e. 1100 °C, 1175 °C, and 1250 °C. At each temperature, the sheets were soaked for 1 h, 2h, and 3h. Post-annealed samples and starting material have been studied for microstructural and macro-texture evolution. A decrease in grain size has been observed after post-annealing as compared to the starting material due to the nucleation of sub-grains during post-annealing heat treatment. Macro-texture study showed the evolution of rotated cube texture components after post-annealing at 1100 °C and 1175 °C. However, starting material and post-annealed samples at 1250°C showed the appearance of strong □-fibre. Samples post-annealed for 3 h (maximum soaking time) at all three investigated temperatures along with the starting material have been investigated for mechanical behavior using a room temperature compression test. The yield strength of the starting material has been observed to be maximum followed by the sample post-annealed at 1250°C. Samples post-annealed at 1100 °C and 1175 °C displayed slightly lesser yield strength due to the presence of rotated cube texture components.