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Tensile properties of TiBw/Ti6Al4V composites fabricated by powder metallurgy

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A series of TiBw-Ti6Al4V composites with very low volume fraction (0.25%-2.0%) of reinforcement were successfullyfabricated by powder metallurgy process. In the fabrication process, the TiB_2 powders asboron source were adheredonto the surface of Ti6Al4V powders in the low energy milling process, and then, the TiB whisker reinforcement were in situ synthesized by the reaction between TiB_2 and Ti. It is surprised to find that not only the tensile strength but also the ductility of the as-sintered 0.25vol.% and 0.5vol.% TiBw-Ti6Al4V composites are higher than those of the as-sintered Ti6Al4V alloy. It is worth pointing out that the yield strength (787MPa), ultimatetensile strength (885MPa) and the tensile elongation (14.3%) of the Ti6Al4V alloy are certainly reasonable. However, the 0.25vol.% TiBw-Ti6Al4V composites exhibit 975MPa of ultimate tensile strength and 22.8% of tensile elongation. In addition, it is reasonable that the tensile strength increases while the elongation decreases with increasing volume fractions of TiB whisker. The 2.0vol.% TiBw-Ti6Al4V composites exhibit 1070MPa of ultimate tensile strength and 9.1% of tensile elongation. The superior tensile properties of the as-sintered TiB-Ti6Al4V compositesare related to not only grain refinement but also novel deformation and fracture mechanisms.

Biography:

Dr. Jie Zhang received her Ph.D, in Materials Science and Engineering from Harbin Institute of Technology, China, in 2005, and has been the director of the Center of Analysis and Measurement, Harbin Institute of Technology, China, since 2013. She has published more than 100 papers in the field of Materials Science and Engineering.