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Enhancement of sliding wear resistance of Titanium alloys by surface tin grid reinforcement

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Titanium alloys have relatively low hardness and poor wear resistance. Surface engineering technologies such as PVD are often used to introduce a surface coating and thus increase the surface hardness of the alloy. However, the physical interface between coatings and alloy matrix is always a concern as surface de-scaling happens often. Another popular method to improve wear resistance of Ti alloys is introducing Titanium-metal-matrix-composites (Ti-MMC). A ceramic phase is embedded in the Titanium matrix and serves to enhance the wear property during sliding wear application. This paper explores a new method to produce a novel type of Ti-MMC for wear improvement purpose. A reinforcement network grid of titanium nitride (TiN) tracks produced by laser gas nitriding technique will be fabricated on the alloy surface and the tracks are metallurgically bonded to the alloy matrix. The improvement in wear resistance will be related to the grid density and dimensions of TiN track. Surface grid approach combines both technologies of surface engineering and metal matrix composite to enhance the war resistance of Ti alloy.

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