

Effect of Gas-Diffusion Oxynitriding on Microstructure and Hardness of Ti-6Al-4V Alloys

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Abstract : The commercially available titanium alloy, Ti-6Al-4V, was oxynitrided in the deoxygenated nitrogen gas at high temperatures followed by cooling in oxygen-containing nitrogen in order to analyze the influence of oxynitriding parameters on the phase modification, hardness, and the microstructural evolution of the oxynitrided coating. The surface microhardness of the oxynitrided alloy increased due to the strengthening effect of the formed titanium oxynitrides, TiN_xO_y . The maximum microhardness was obtained, when TiN_xO_y had near equiatomic composition of nitrogen and oxygen. It could be attained under the optimum oxygen partial pressure and temperature-time condition.

Keywords : titanium alloy, oxynitriding, gas diffusion, surface treatment

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