

POLITECHNIKA ŚLĄSKA
WYDZIAŁ MECHANICZNY TECHNOLOGICZNY

Rozprawa doktorska

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**Wpływ przetapiania laserowego na strukturę i właściwości
warstwy wierzchniej stopu tytanu alfa**

Promotor

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Abstract

The goal of the thesis was to analyze the experimental method of laser remelting at cryogenic conditions on α -phase titanium alloy with optimization of treatment parameters (power and scan rate). HPDL diode laser made by ROFIN SINAR DL 020 was used for laser remelting method with maximum beam power of 2.3 kW. There were straight laser scans made with various power (1÷2,3 kW) and scan rate settings (0,4 ÷1 m/min.). The process was done in cryogenic conditions with fast cooling of samples using liquid nitrogen at the temperature of -195°C. The parameters of the samples including hardness and wear resistance were improved while the corrosion resistance remained unchanged.

The titanium alloy surface layer was modified with the laser treatment at cryogenic conditions. The parameters of the surface were analyzed including microstructure, residual stress and wear resistance. The microstructure was analyzed together with its chemical structure, hardness and corrosion resistance.