

Estimation of titanium oxide layer thickness on thermally oxidized NiTi alloy based on color variations(Article)

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Abstract:

This paper studies the estimation of titanium oxide (TiO₂) thickness on a thermally oxidized nickel titanium (NiTi) alloy based on its surface color. The NiTi plate specimens were subjected to oxidation at temperatures from 450 °C to 900 °C for different duration to induce the formation of oxide layers of different thicknesses. The oxide thickness of the specimens oxidized from 650 °C to 900 °C was measured by means of scanning electron microscopy. A fitting curve was generated from the measured thicknesses, and further extrapolated to predict the oxide thickness for specimens heated at lower temperature of 450 °C to 600 °C. The oxide thickness estimation was done using thin-film optical interference, with reference to the observed color of the oxidized surface. The thin-film optical interference approach showed accurate measurement of oxide thickness as compared to the extrapolated data, highlighting the applicability of this measurement technique. © 2022 Wiley-VCH GmbH

ISSN: 9335137

DOI: 10.1002/mawe.202100084

PUBLISHER : SCOPUS