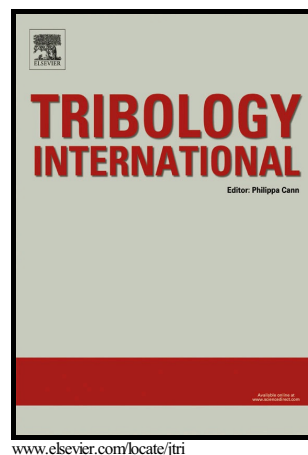


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Effects of oil-in-water based nanolubricant containing TiO₂ nanoparticles on the tribological behaviour of oxidised high-speed steel

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Abstract

In this work, the effects of the developed oil-in-water (O/W) based nanolubricants containing TiO₂ nanoparticles (NPs) on the tribological behaviour of oxidised high-speed steel (HSS) were studied, using pin-on-disc tests. The pin was made of HSS and, prior to the wear test, was oxidised to form a scale layer on the surface. The results show that the TiO₂ NPs in the O/W lubricant can achieve an excellent reduction of the coefficient of friction (COF) and improve the anti-wear properties of pins with oxidised surfaces. The TiO₂ NPs in the nanolubricant were found to have the filling and tribo-sintering effects. The NP aggregation around the contact area was observed with higher TiO₂ NP concentrations in the nanolubricant, revealing a larger NP aggregation area. Based on the results and analysis, the mechanism about the effects of the TiO₂ NPs in the O/W based nanolubricant on the wear and COF were well explained.

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