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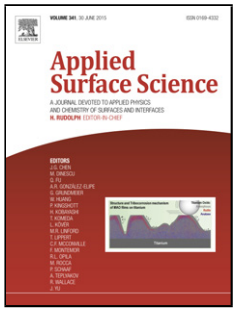

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ACCEPTED MANUSCRIPT

Effect of nitrided-layer microstructure control on wear behavior of AISI H13 hot work die steel

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Highlights

- Wear behavior of steel H13 with different nitrided surface layer was investigated.
- The microstructure of the nitrided surface layer had been precisely controlled.
- The wear mechanisms of nitrided surface layers were revealed.

Abstract

Gas nitriding has become a popular thermo-chemical surface treatment, which is being used to develop thermal/mechanical fatigue and wear characteristics of iron and steels. In this study, the gas nitriding of AISI H13 hot work die steel was carried out in flowing NH_3 gas at 550°C for 5~15 h. By adjusting the nitrogen potential ranging from 0.18 to 2.8, three types of nitrided surface layer consisting of ε-$Fe_{2-3}N$ and γ′-Fe_4N phases, γ′-Fe_4N single-phase, as well as the α-(Fe, N) phase had been prepared, respectively. The corresponding microstructure, hardness and thickness of the nitrided layer were systematically characterized. A contrastive analysis of influence of nitrided-layer microstructure control on wear behavior of AISI H13

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