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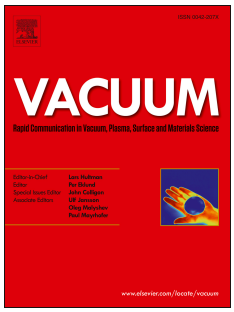

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High-temperature wear properties and microstructural characterization of 40CrNiMo structural steel treated by cryogenic laser peening

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Abstract: The purpose of this study was to explore the effects of Cryogenic Laser Peening (CLP) on the high-temperature wear properties and microstructural response of 40CrNiMo structural steel. The high-temperature wear characteristics and the microhardness in depth direction were measured, as well as the worn surface morphologies were observed by Scanning Electron Microscopy (SEM), while the microstructure was also characterized by Transmission Electron Microscopy (TEM) observation. The experimental results cleared that CLP could effectively increase the microhardness, as well as a large number of twins, higher-density of dislocation structures and ultra-fine grains were produced by CLP, leading to a remarkable decrease of wear mass loss and thus an improved high-temperature wear resistance. Moreover, the microscopic strengthening mechanism of CLP was also analyzed in detail.

Keywords: 40CrNiMo structural steel; Cryogenic laser peening; High-temperature wear properties; Microhardness; Microstructural characterization.

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