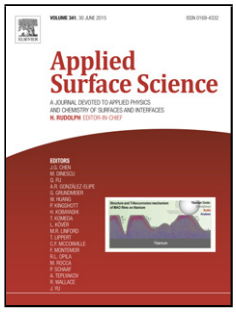

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Tailored frictional properties by Penrose inspired surfaces produced by direct laser interference patterning

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Surface engineering, laser surface texturing, friction and wear

Abstract:

In this work, periodic line-like and quasi - periodic Penrose-like patterns were produced on polyimide samples by direct laser inference patterning. The homogeneity and symmetry of the produced patterns were characterized with white light interferometry, light microscopy and. Fourier-transformation of the acquired images thus confirmed good quality of the Penrose-like pattern. Infrared spectroscopy was used to study the chemical changes after the laser treatment. No significant influences could be detected after irradiating the Polyimide surfaces. Tribological experiments (Polyimide substrate versus steel ball) under dry sliding conditions were performed using ball-on-disk tribometer in linear reciprocating sliding mode as a function of the relative alignment of the sliding direction with respect to the pattern orientation. The measured coefficient of friction strongly depends on the patterning.

The periodic line-patterns with an orientation parallel to the sliding direction showed the highest COF of all samples. After a running-in of approximately 50 sliding cycles the Penrose-like patterns with a 0° orientation showed the lowest coefficient of friction.