

PROCEEDINGS

Formation of Horizontal Dislocation Wall in Metals During Tribology

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ABSTRACT

Microstructural alteration of tribo-elements' the near-surface region significantly affects how long a tribo-system will last. To design and tailor future surfaces of tribo-elements, a fundamental understanding of microstructure evolution under local tribological exposure is required. During the initial steps of macro-tribological process in metals, horizontal dislocation walls have been observed, which later develop into the grain-refined tribolayer, however, their fundamental mechanisms are yet unknown. In this work, we developed a novel micro-tribological test, in order to directly inspect the contact zone and simplify the stress status. Our preliminary basic tribological experiments identify grain orientation and twin boundary effects in dry environment, and depict the microscale formation mechanism of a horizontal dislocation wall during the tribological process. This fundamental microscale research can enhance our comprehension of macroscale tribology and offer suggestions for lowering replacement prices, noise levels, and energy usage in dry environment.

KEYWORDS

Nanotribology; dislocation wall; metal; microstructure evolution

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