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Local Transformation of Amorphous Hydrogenated Carbon Coating induced by High Contact Pressure

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Abstract

The development of coatings presenting adaptive characteristics based on mechanical loads would promote improved local characteristics. In this work, the surface modification of an a-C:H coating was analyzed based on the contact pressure using two tribological tests: lubricated reciprocating ball-on-plane and dry micro-scratch tests. Local transformation were evaluated based on Raman spectroscopy and indentation hardness. Results indicated regions presenting a red-shift of the G band and higher indentation hardness. High compressive stress field developed under the contacting region (numerical simulations) coupled to the red-shift of the G band and the increase on indentation hardness inside the tested regions are compatible with the nucleation of sp^3 carbon bond sites derived from sp^2 bonds, indicating a possible modification of the coating.

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