MICROFRICTION OF ZrCN COATINGS CHARACTERIZED BY ATOMIC FORCE MICROSCOPY

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ZrCN coatings were formed on the polished steel substrates by magnetron sputtering using the mixture of acetylene and nitrogen and pure zirconum target at the various rates of acetylene flow in the reaction chamber (0-3 cm^3/min). The thickness of the ZrCN coatings was approximately 3 μm. Using atomic force microscopy (AFM) with a diamond tip in the Contact Mode under ambient temperature and humidity controlled conditions, we studied the surface morphology, roughness (Ra), friction coefficient (C_{fr}), friction force (F_{fr}), specific volumetric wear (ω) of ZrCN coatings with the construction of C_{fr} dependencies on the number of scan cycles. It was found that the coating obtained at a acetylene flow rate of 3 cm^3/min has the lowest values of C_{fr} (0,062±0,004) and of F_{fr} (196,3±14,6 nN) among the ZrCN coatings. The highest C_{fr} (0,103±0,013) and F_{fr} (324,5±42,1 nN) has ZrCN coating obtained at a acetylene flow rate of 1.5 cm^3/min. The dependence of the C_{fr} and F_{fr} on the consumption of acetylene for ZrCN coatings is nonmonotonic. It was determined that Ra on the area 1x1 μm changes with increasing of acetylene concentration in the gas mixture nonmonotonously too: from 5.27 nm for 1 cm^3/min, to 5.96 nm for 1.5 cm^3/min and to 2.68 nm for 3 cm^3/min. C_{fr} correlates with Ra and don't completely correlates with ω of ZrCN coatings. The depth of wear obtained with similar conditions is 2.2 nm for 1 cm^3/min, 6.6 nm for 1.5 cm^3/min and 7.7 nm for 3 cm^3/min.

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