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Comparison of Tribological Properties of TiO_2, ZrO_2 and TiO_2–ZrO_2 Composite Films Prepared by Sol–Gel Method

Authors : O. Çomaklı, M. Yazıcı, T. Yetim, A. F. Yetim, A. Çelik

Abstract : In this study, TiO_2, ZrO_2, and TiO_2–ZrO_2 composite films were coated on Cp-Ti substrates by sol-gel method. Structures of uncoated and coated samples were investigated by X-ray diffraction and SEM. XRD data identified anatase phase in TiO_2 coated samples and tetragonal zirconia phase in ZrO_2 coated samples while both of anatase and tetragonal zirconia phases in TiO_2–ZrO_2 composite films. The mechanical and wear properties of samples were investigated using micro hardness, pin-on-disk tribotester, and 3D profilometer. The best wear resistance was obtained from TiO_2–ZrO_2 composite films. This can be attributed to their high surface hardness, low surface roughness and high thickness of the film.

Keywords : sol-gel, TiO_2, ZrO_2, TiO_2–ZrO_2, composite films, wear
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