Tribocorrosion response of an Aluminum Matrix Nanocomposite obtained through Friction Stir Processing

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The aim of this work was to characterize the tribocorrosion behaviour of an Aluminum Matrix Nanocomposite (AMNC) obtained through Friction Stir Processing (FSP) and tested under sliding-corrosion conditions. Four passes of the tool were used to introduce and distribute Al_2O_3 nanoparticles (70 nm) in 2mm depth of an AA6061 aluminium alloy. Polarization curves of the samples were obtained in 3.5 wt.% NaCl solution and tribocorrosion tests were developed in a ball-on-disc tribometer using the same solution and an alumina ball as counterbody. The evolution of the Open Circuit Potential during test time was followed, and the coefficient of friction and wear were assessed and compared to those of friction stir processed samples without nanoparticles (FSPed). SEM images were used to characterize the surface and the wear mechanisms after tests. The results showed that the introduction of nanoparticles produced a reduction in the OCP drop during the sliding period and the recovery of almost the initial OCP value when the sliding finished. On the other hand, a negligible effect of the nanoparticles on the coefficient of friction was observed.