Contribution of the in situ determination of the wear surface, volumes and kinetic of repassivation in the understanding of the tribocorrosion behaviour of a ferrite stainless steel.

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The corrosion wear behaviour of stainless steel is controlled by synergistic effects where the mechanical and the chemical components act together. In most of the cases, the mechanical contribution controls the degradation. However, the influence of the wear accelerated corrosion has to be taken into account since the wear is affected by the passive film which is itself pH dependant. To discuss the role of the solution pH on the tribocorrosion resistance of a ferritic stainless steel, a galvanic coupling was used to measure simultaneously the potential and current under sliding and to quantify the repassivation kinetic of the surface. Moreover, an optical microscope was implemented in the tribocorrosion cell to evaluate the worn surface and the wear volume continuously. After a presentation of the analytical approaches used to extract information on the wear rate and the repassivation kinetic of the surface, results will be exposed. The in situ record of mechanical degradation of the material confirms the linear loss of matter as proposed by Archard. It also points out the non-linear dependence of the Archards coefficient to the solution pH as the nature of the oxide layer change with pH. The in situ characterization of the worn surface reactivity shows the role the redox potential of the solution, its influence on the oxide film rebuilt kinetic and its contribution in the total wear.