

On the use of the scanning Kelvin probe for assessing in situ the delamination of adhesively bonded joints

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Many industries nowadays rely on the adhesive bonding technology for their success, most notably aerospace, automotive, construction, and the electronics industry. The main advantages of the adhesives are their ability to bond dissimilar materials and the more efficient load transfer in comparison to other joining methods. Several industrial applications request the adhesive joint to withstand loads under different environmental conditions such as high moisture, and extreme temperatures. Thus, predicting the lifetime of adhesively bonded joints under moist environments is crucial to support tailoring the properties for the respective application demand. Relevant effects of water in adhesively bonded components may be strength degradation and introduction of stresses. Knowing the behaviour of the water in adhesive joints may contribute to directing the design of bonded components, lead to greater confidence and increase the use of adhesives in the industry.

This work presents a novel application for the scanning Kelvin probe (SKP) on the assessment of the delamination processes of adhesively bonded joints. *In situ* scanning kelvin probe studies of the local interfacial potentials at buried glass/polymer/oxide/metal interfaces of real closed joint geometries are performed using similar approach as in the study of delamination of coatings [1]. The potential difference distribution is measured time-dependent in order to obtain information about the delamination kinetics. After the removal of the adhesive layer the interfacial ion distribution was analysed by means of X-ray photoelectron spectroscopy (XPS).

[1] A. Leng, H. Streckel, M. Stratmann, The delamination of polymeric coatings from steel. Part 1: Calibration of the Kelvinprobe and basic delamination mechanism, *Corrosion Science* 41 (3) (1998) 547-578.