

Application of a Differential Photoacoustic Cell in the Study of In-Situ Electrochemical Deposition of Zinc

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A study of the electrochemical deposition of Zn in real time using the DPC (Differential Photoacoustic Cell) was performed. Looking for a protective coat for the corrosion process, the steel A36 was selected as a cathode and high purity zinc (99.99 %) as an anode. The reference material used was also A36 steel. The steel was polished in order to get a thickness of 300 microns. The solution used was constituted by HBO_3 , KCl , and ZnCl_2 . The selected current was 0.2 A, and all of the depositions were made at room temperature, being possible to use the DPC at different bath temperatures. A laser of 532 nm was used as the heating source. With this configuration, it is possible to obtain the amplitude and phase signals in real time for the sample and the reference sample, with the Lock-in technology it is possible to obtain the signals coming from the process without any previous calibrations that could involve changes in the laser and electronic behaviors. With the DPC, the growth of the deposit can be studied in-situ. SEM was used to evaluate the superficial microstructure and GDS to obtain a compound profile as well as the coat thickness.