

Degradation of Organic Coatings Metal Investigated by Multi-Impedance Measurements

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Metal is corroded by the chemical and/or electrochemical reactions with the surrounding environment. The isolation of the metallic surface from the environment is most effective to prevent the corrosion. There is painting as one of the corrosion protections. The electrochemical impedance spectroscopy (EIS) has been used to evaluate the corrosion of steel coated by the organic corrosion. Generally, the process from the degradation of organic film to the corrosion at the organic film/metal interface is quite complicated. The equivalent circuit consists of time constants of film resistance and film capacitance and of electric charge transfer resistance and electric double layer capacitance. Kittel *et al*¹⁾ measured the impedance of the organic films with the measurement of the electrode impedance by arranging the gold comb taken as potential probe inside the organic film. However, the vacuum setting of the first layer for the gold deposition changes the comparison with a real system. In the present paper, the carbon fibers were arranged inside the organic film in the room temperature. Multi-impedance concerning the organic film degradation was measured continuously by using the 4 channel frequency response analyzer and plotted on the three dimensional complex diagram. Some parameters (film resistance and capacitance) related to film degradation were obtained by the present method, and the film degradation mechanism was examined.

References

1) J.Kittel, N.Celati, M.Keddam, H.Takenouti, 5th EIS, 171-173 (2001).