

## ABSTRACT

### **Polarization resistance sensor for monitoring the corrosiveness of the air environment**

Andriichuk O. O. – Kyiv: «Igor Sikorsky Kyiv Polytechnic Institute», ChTF, ChE- 91mn.

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In the master's dissertation the literary search of factors influencing corrosion of aluminum and its alloys and monitoring methods is carried out. Three designs of the polarization resistance sensor for monitoring the corrosion aggressiveness of the air environment have been developed, of which the surface placement of electrodes cut by laser and glued to the dielectric substrate is optimal. It is established that the greatest reliability of obtaining and interpreting the measurement results in model electrolyte solutions is achieved in solutions of sodium chloride and sulfate in the absence of potassium bicarbonate. It is established that the effect of carbon dioxide on the corrosive aggressiveness of air is several orders of magnitude lower than the effect of relative humidity, and the effect of sulfur dioxide concentration is decisive in moistening the surface with phase films during capillary and droplet condensation of water on electrodes. A simplified method of cyclic potentiostatic polarization of sensor electrodes to polarization with only two extreme values of amplitudes of anodic and cathodic polarity is substantiated, which increases the efficiency and reliability of this simple method in the case of transient processes. Impedance spectroscopy has shown that the sensor can distinguish the active resistance of the electrolyte from the active polarization resistance, so it makes sense to move on to special measurements in the galvanostatic mode. Analysis of the Nyquist and Bode diagrams showed that the sensor readings depend on the duration of humidification by the condensate phase films. Therefore, fast model wetting in any way is in principle not able to reproduce the effect of gradual slow wetting with natural condensate. It was found that the increase in the amount of condensate on the surface

of the electrodes and the increase in the concentration of chloride ions, which are particularly prone to sorption and complexation, increases the inductive response of the developed sensor.

**KEY WORDS: POLARIZATION RESISTANCE SENSOR, CORROSION OF ALUMINUM ALLOYS, COMPOSITION OF THE AIR ENVIRONMENT, TWO-ELECTRODE CIRCUIT, POTENTIAL**