Coating Steel with Nanosilica by Pulsed Direct Current Electrophoresis for Corrosion Protection

Name : Ni Made Intan Putri Suari
NRP  : 2311201007
Department : Master Program of Chemical Engineering ITS
Advisor  : Prof. Dr. Ir. Heru Setyawan, M.Eng

ABSTRACT

The purpose of this research is to study the silica deposition process on stainless steel by pulsed direct current (PDC) electrophoresis. Silica sol made of sodium silicate was used as the electrolyte solution. The frequency, amplitude and duty cycle of PDC were evaluated. The frequency, amplitude and duty cycle of PDC were varied in the range of 30-80 Hz, 0.1-0.6 Volt and 30-80%. The morphology of silica film was observed by scanning electron microscopy (SEM) and the corrosion protection properties of the silica films were analyzed by electrochemical impedance spectroscopy (EIS) in 2 wt% NaCl solution. The experimental results showed that by PDC electrophoretic a good corrosion protection characteristics of silica films (high pore resistance and low admittance) were produce. The corrosion protection characteristics of silica films were affected by the frequency, amplitude and duty cycle of PDC. By increasing the frequency, could be produced the more uniform silica films. The high pore resistance (788.290 ohm) and the low admittance (0.00087573 Mho) of silica film was produced at the frequency of 80 Hz, amplitude of 0.5 volt and duty cycle of 60%.

Keywords: Electrophoresis, pulse direct current, silica sol, electrochemical impedance spectroscopy
(HALAMAN INI SENGAJA DIKOSONGKAN)