

Corrosion properties of silica films coated on copper foil by Sol-Gel synthesis

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Abstract:

Synthesis of oxide films on metals via sol-gel process has been attracted much attention for protection materials from corrosion environment. But cracking formation during coating and poor adhesion strength between coating films and metal substrate, application of sol-gel process showed limited application in the field. But from economical view and available size of treatment for oxide film coating on metals, sol-gel coating still attract much concern recently. From this experiment we could obtain homogeneous and free of cracks coatings of SiO₂ films by sol-gel silica coating method.

Sol-gel silica films were deposited on copper foil by using tetraethyl ortosilicate (TEOS) as chemical precursor. Substrates were coated by spin coating for 4 or 5 times. All samples were dried at 80°C and sets of samples were vacuum heat-treated at 350°C, 400°C, 450°C and 500°C respectively. Surface micrographs were observed by SEM. Corrosion properties were analyzed before and after coating respectively in 3.5% NaCl solutions by using polarization and impedance measurement.

As a result of this experiment, homogeneous and crack free SiO₂ films could be coated by sol-gel silica method. Also, silica coated films showed improved corrosion resistance against NaCl and acid solution respectively.