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The influence of humidity on conductivity polyelectrolite epoxy composite

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Humidity is a major cause of metal corrosion. Modern anti-corrosive insulating coating to fully protect against aggressive media components. However, the delamination of cathodic protection currents cannot permeate the metal, due to the high electrical resistance of these coatings, and diffusing hostile environment causes underfilm corrosion.

Existing conductive (non-shielding) coating applied for protection in conjunction with cathodic protection are the solution to the problem underfilm corrosion, but the application of such systems is not justified increasing the current consumption of cathodic protection stations.

We conducted a study of the conductive properties of polyelectrolyte polymer composite based on epoxy binder by electrochemical impedance spectroscopy, depending on the moisture content in it. Varied content of the polyelectrolyte in the polymer matrix and the thickness of coatings on steel substrate.Found that the conductivity of the material depends on its moisture content. The conductivity of the material in air-dry state is 28 MOhm × mm. When moisture content of about 0.5%(wt.) jump in conductivity percolation occurs, its value reaches about 68 KOhm × mm.

Found that the coating thickness of 0,15-0,30 mm in the hydrated state allows the material to pass through a cathodic current required for protection of metal density, whereas in the dry state is an insulator. Conductive properties of the investigated polyelectrolyte composite can apply it when infliction to the metal structure before the conductive layer. The function of this layer is to reduce the electrical resistance in the presence of moisture between the coating and the metal structure that promotes the pervasion of cathodic protection current to the protected object, and in the absence of an aggressive environment in the metal to the sheilding, and as a consequence of reducing the cost of consumable cathode current.

Biography

Nikolay N. Petrov has completed his Ph.D at the age of 24 years from Kuban State University. He is the chief technologiest of company "Modern technologies", working in the field of engineering design for oil and gas industry. Area of interest is the anticorrosion protection and technosphere safety.

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