

Efficient Evaluation of Amorphic Corrosion Resistance using Electrochemical Impedance Spectroscopy (EIS)

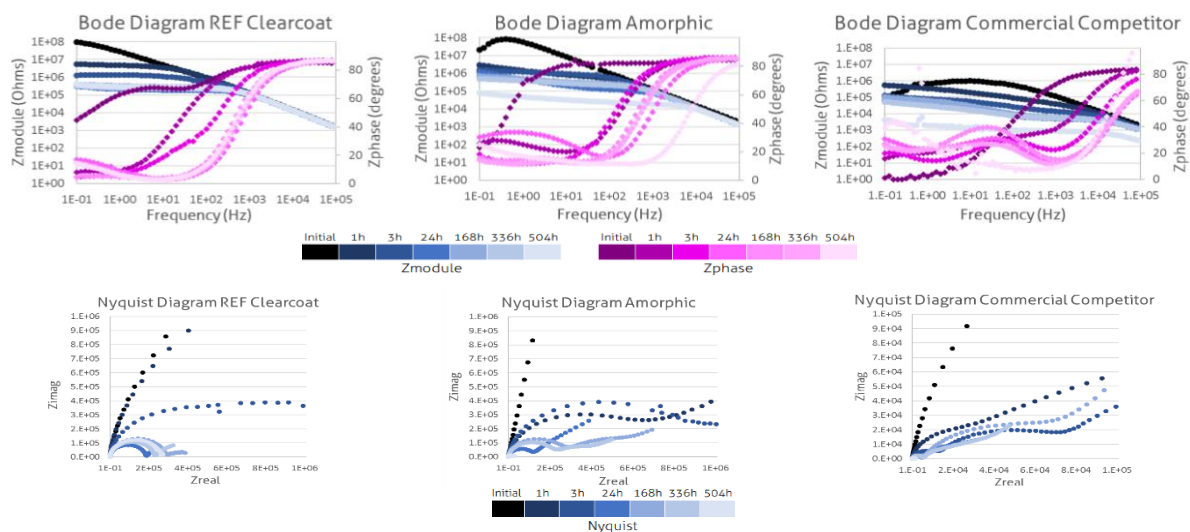
For our customer Bunge Amorphic Solutions, VLCI has evaluated their Amorphic anti-corrosive pigment via various electrochemical methods, using a potentiostat (Electrochemical Impedance Spectroscopy (EIS), Linear Polarization Resistance (LPR)). Amorphic has shown excellent performance against a commercial competitor.

About Electrochemical Impedance Spectroscopy (Standard EIS, ISO 16773)

EIS is a well-established quantitative method for the accelerated evaluation of the anti-corrosive performance of protective coatings. Within short testing times (3 weeks immersion in salt water), EIS measurements provide reliable data (coating resistance, water uptake, corrosion rate), allowing for the prediction of the long-term performance of the coatings (see more on <http://vlci.biz/corrosion-testing-via-electrochemical-impedance-eis/>).

Evaluating the performance of Amorphic in protective coatings

Using standard EIS (ISO 16773), VLCI has screened the performance of Amorphic in a water-based acrylic resin suitable for protective coatings applications, and compared it with a commercial competitor. A clear-coat without anti-corrosive pigment was used as a reference.



As seen in the graphs above, the reference clear-coat gives the classical response of a coating with good film formation and low porosity, starting as a high impedance pure capacitor, which decreases while immersed. In the case of the commercial competitor, initial impedance is lower and shows a fast decrease over time, and the film lost complete integrity after 3 weeks immersion. The Amorphic sample shows a better immersion resistance, holding during the 3 weeks of immersion. As with the commercial competitor, impedance initially drops (water penetrating pores), but holds in a steady state for the first two weeks of immersion. These results are correlating with the LPR testing which was performed in parallel (see TDC doc: Efficient Evaluation of Amorphic Corrosion Resistance using Linear Polarization Resistance (LPR)).

What are the targeted product developments?

The targeted applications are protective coatings, from high to low PVC levels. VLCI can help you implementing Amorphic in your formulation, to achieve the desired properties, and quickly and efficiently assess the corrosion inhibition using these electrochemical methods.