B. Münzing, J Nanomed Nanotechnol 2018, Volume 9
DOI: 10.4172/2157-7439-C9-091

Corrosion protection with graphene

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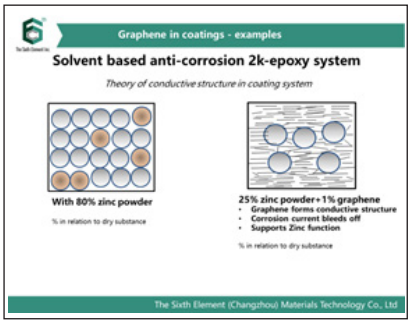

Graphene, theoretically the atomic layer of graphite, can now be produced on large industrial scale. Most of these processes generate few layer graphene. The Sixth Element has established a proprietary process to manufacture different types of graphene with specific designed properties for different applications. Research on how to use graphene in coatings started already 2013 with the focus to reduce zinc in solvent based corrosion protection coating systems. In standard primers with high zinc content, zinc acts as cathodic sacrifice layer, as zinc is more ignoble metal, therefore protecting the underlaying metal substrate. When the zinc is more and more oxidized, the resulting zinc oxide is building up a barrier, which prevents the attack of the surrounding media (water, salt) to the metal substrate. The idea now was to design a graphene type, being electrical conductive enough to support any cathodic function of the system and being able to act as a barrier without producing a battery cell. A further requirement was that such a graphene can be processed with standard equipment used in the coating industry. Cooperating with an industrial partner in China, Toppen Co, the graphene type SE1132 was developed. It is a few layer graphene with medium conductivity. Addition of 1 % SE1132 to an epoxy primer system and reducing the zinc content to 25 % (based on dry substance) show significant improvements in salt spray testing and water condensation testing compared to a standard zinc rich epoxy primer. The results have been confirmed by measuring the corrosion current of such a system. Sixth Element had been granted a patent in China and US for this development. Based on independent tests of Chinese authorities the system) is approved for off-shore applications, first applied to protect the steel construction of an off-shore wind energy tower in 2015.

Biography

Bernhard Münzing started his career at BASF selling fibre reinforced prepregs mainly to the aerospace and sports industry. He then joined L. Brüggemann, a medium sized chemical company, responsible for materials management and market introduction of new products. After short period as Sales Manager for a small paint company, he worked for more than 17 years for GELITA, the leading gelatine manufacturer. Covering all potential applications areas for gelatine, he helped customers to adopt the product during the critical phase of the BSE disease, followed by a position in business development for more than 10 years, introducing a new product line to the food market, establishing a new production technology for a special gelatine and launching gelatine -based formulations into the metal processing industry. Since July 2016 he is with The Sixth Element, a leading supplier of graphene products responsible for all markets outside China with focus on EMEA region.

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