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A special electrochemical corrosion reaction between metals and solid NaCl in H_2O+O_2 at 600oC

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Abstract

The corrosion scourge is an unassailable vital problem in the process of human civilization and development. It can bring huge losses for industry, and also threaten the safety of lives and property. Researchers study the corrosion behavior of metals/alloys in various environments or analyze the corrosion mechanisms, which finally aims to find effective ways to protect materials from corrosion. The traditional corrosion reactions of metals are mainly oxidation and electrochemical reactions. The oxidation reaction takes place in high temperature environment (maybe above 400oC), and the electrochemical reaction is mainly the process of losing electrons of metals in aqueous solution or molten salt and the process of obtaining electrons of hydrogen or oxygen. However, in recent years, a new special electrochemical reaction has been found in the study of corrosion behavior of compressor blade materials of aircraft engines serving in marine environment. This electrochemical reaction occurs between metal and solid salt and involves H2O and O2. This electrochemical reaction is very special, and based on precursor chemistry chemical reactions, in which the conductive medium changes from the traditional water medium to the ion transport material in the chemical reaction, and the electrochemical reaction also promotes the chemical reaction and metal transport to accelerate the corrosion reaction. Different metal elements have different sensitivity to this electrochemical corrosion reaction, among which the traditional corrosion-resistant metals Ti and Cr are the most sensitive, while the traditional non-corrosion-resistant Fe and Mg are very insensitive. The study of the electrochemical reaction mechanism helps to further understand the electrochemical reaction, and also provides a basis for material selection and protection methods of metal materials in this environment.

Biography

Liu Li, Dr. of Material Science, has his expertise in Corrosion and Protection (metallic materials and polymer coating). Her study mainly focuses on the electrochemical corrosion behavior of nano-materials, the failure mechanism of polymer coatings in deep-sea environment, the basic theory of chemical-electrochemical interaction of materials in high-temperature marine environment, and the development of integrated marine anti-corrosion and absorbing polymer coatings. She is author of over 80 international SCI articles, 2 books on corrosion and protection. She was invited to report on 7 international conferences, 2 of which were invited by the keynote presentation.

Publications

1. Tuning the Nature of N-Based Groups From N-Containing Reduced Graphene Oxide: Enhanced Thermal Stability Using Post-Synthesis Treatments.
2. Synthesis of hydrophobic zeolite X@SiO2 core–shell composites
3. One-pot generation of mesoporous carbon supported nanocrystalline calcium oxides capable of efficient CO2 capture over a wide range of temperatures
4. Synthesis and adsorption properties of titanosilicates ETS-4 and ETS-10 from fly ash

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