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Self-healing smart anti-corrosion coating based on functionalized carbon particles

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The issue of corrosion is a well-known problem and it causes the weakening of metal and its properties and makes it unfit for use. Corrosion causes enormous economic losses consistently over years in equipment maintenance, repair, and its substitution. In Gulf Cooperation Council (G.C.C) countries, money spent into corrosion control and repair are extremely dependent on production of oil, refining and petrochemicals sector shall be noteworthy as it comprises more than 33% of gross domestic products. Until now, various coatings have been developed to tackle this problem like sacrificial coatings, barrier coatings, noble metal coatings and electrically resistive coatings. In this study, self-healing smart anti-corrosion coatings were synthesized as it is a much lesser investigated area of research. Functionalized particles from mesoporous carbon along with mesoporous silica etc. were used as Nano containers for encapsulation of corrosion inhibitor for self-healing purpose using layer-by-layer (LbL) self-assembly method and their effect on performance of coatings were studied after adding in commercially available polymer matrix against the

corrosion of mild carbon steel in seawater. A series of tests were conducted on the resultant coatings to investigate their corrosion resistance, self-healing performance etc. This study will evaluate the protection offered by coatings of commercially available porous materials against the corrosion of mild steel in seawater, along with addition of different encapsulated nano containers in the polymer matrix. Benzotriazole (BTA) was used as a corrosion inhibitor in this study for synthesizing Nano containers. Self-healing smart anti-corrosion coatings, is a much lesser explored area of research with the major challenge of low adhesion properties and release of Nano containers to heal the corroded metal substrate. This calls for preparation of substrate surface and treatment of coatings to establish good interfacial interaction of the nano containers with the porous material and their successful release in the medium upon a pH change to avoid delamination/corrosion of coatings in water. The potential of the functionalized carbon materials to further enhance anticorrosion performance of the self-healing coatings was also evaluated..

Biography

Ahmed Tabish presently working as a Researcher at Petroleum Institute Research Center of Khalifa University of Science and Technology, Abu Dhabi, UAE in the field of corrosion coatings based on polymers for oil/gas industry and also on CO₂ conversion using perovskites. Myself Ahmad Tabish, a graduate in Chemical Engineering from Aligarh Muslim University, India; batch 2014. I have a good International and National exposure in working in Research projects. Presently, I am a Researcher at Petroleum Institute of Khalifa University of Science and Technology, Abu Dhabi National Oil Company (ADNOC) at Abu Dhabi, UAE.

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