

Foreword to the Special Issue

Prof. Dr. Husnu Gerengi

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EDITORIAL

Foreword to the Special Issue

I am very pleased to present the Special Issue “**Recent advances on surface protection of steel – Relevant contributions at 2nd International Conference on Corrosion and Surface Protection for Steel (CASP 2022)**”.

Corrosion is undoubtedly one of the major challenges in all sectors where metals are used. The effect of corrosion is enormous and ranges from economic drain to threat to life. The task of addressing the corrosion menace is resting on us – the corrosion scientists, engineers, consultants, and others. To adequately address the corrosion challenge, corporate action is sacrosanct. All parties must come together to discuss and take joint decisions and actions. There must be a strong industry-academia collaboration to enable the scientific works piling up on the shelves to be transformed into problem-solving products.

One of the missions of the Turkish Constructional Steelwork Association (TUCSA), established in 1992, is to raise the awareness of the industry community on the impact of corrosion beyond monetary to environmental, health, and safety risks. Through a partnership with the European Convention for Constructional Steelwork (ECCS), every two years, TUCSA organizes an “*International Conference and Exhibition on Corrosion and Surface Protection for Steel (CASP)*” to drive home the message of corrosion risks and to foster industry-academia relationship. This kind of partnership and collaboration needs to be encouraged and embraced by other industries.

A total of 154 scientific papers were received at the CASP 2022 event (<https://www.caspconferences.com/>) which was held on 25–26 May 2022. Twenty-eight of them were accepted for oral presentations. Fifteen of these papers were determined by the juries comprising people from academia and industry, and submitted to the Journal of Adhesion Science and Technology for potential publication. After the peer review process, 9 papers were accepted and they are published in this Special Issue.

In the opening article of the Special Issue, Duran and Şimşek showed the superior corrosion protection of 304-SS in a highly acidic corrosive environment by poly(N-vinyl carbazole)-TiO₂ composite coatings (PNVC-TiO₂).

Anchor elements and pad hooks are becoming increasingly used in modern buildings. Gerengi et al. in the second paper have demonstrated that zinc-free and zinc-rich epoxy coatings are effective in corrosion protection of electro-galvanized pad hooks used in Glass Fiber Reinforced Concrete (GFRC) panels. In the same direction, Topçu et al. examined the effect of metallic coatings on the durability of concrete structures. The authors showed that the thermionic vacuum arc (TVA) TVA system prolonged the damage occurrence time (first crack) and diminished the corrosion reactions that occurred on the reinforcement surface.

Muhammed et al. investigated the corrosion behaviour of aluminized carbon steel C45 samples of 0.44 wt.% carbon content in a half-immersed molten salt mixture (NaCl + Na₂SO₄ with a ratio of 1:3) at 973 K over three different exposure periods (8, 24, and 72 h). The authors have addressed the existence of a new intermetallic layer

(emergent layer) formed at the interface between the steel substrate and the pre-formed intermetallic layers as a result of outward and inward diffusion of Al, Fe, and C.

Shetty et al. presented a non-destructive structural health monitoring (SHM) approach using ultrasonic guided waves with multi-physics modelling to forecast the strength degradation of corroding steel. They used surface-bonded piezoelectric wafer transducers (PWTs) to actuate and sense the guided waves to correlate the group velocity and amplitude of flexural wave modes with the strength reduction. The authors drew attention to the current state of degradation in structural performance and strength-based service life prediction.

Iz and Köylüoğlu assessed the economic value contribution of corrosion prevention provided by the galvanic cathodic protection method during the useful life of marine structures. The sustainability issue was also dealt with.

Pratesa et al. have conducted a comparative study of carbon steel and 3 wt.%- Cr steel in a CO₂-H₂S environment for corrosion reduction.

Lozano et al. have explored the hybrid sol-gel technology for anti-adherent coatings. Hybrid de-moulding sol-gel coatings of silica doped with zinc, titanium, zirconium, fluorosilane, and organosilicons were synthesized. Ultra-thin coatings (film thickness of ~0.15 mm) on the steel surface were suitable for protecting micro texturized moulds.

The Special Issue was concluded with the article by Upiah and Surnam related to the corrosion risk assessment of the ship unloader in the harbour of Port Louis, Mauritius. The authors proposed some suitable solutions for reducing the cost of maintenance and the corrosion cost of the ship unloader as well as other similar structures.

The common aspect of these studies is that they are focused on solving the current problems experienced in the industry. I hope that similar studies, which seek solutions to the problems of the industry, will increasingly continue. It is my earnest belief that these studies will impact the corrosion community positively and significantly.

I sincerely thank all the authors of the papers, for deciding to present the results of their studies in this Special Issue.

I am truly grateful to the Chairman of the Board of TUCSA, Mr. H. Yener Gür'eş, Editor-In-Chief of the Journal of Adhesion Science and Technology, Prof. José Miguel Martín-Martínez, and the reviewers, for the immense support during this amazing journey. I am saying all them "Thank You"!

Prof. Dr. Husnu Gerengi (Guest Editor)

Corrosion Research Laboratory, Department of Mechanical Engineering, Faculty of Engineering, Duzce University, 81620 Duzce, Turkey

 husnugerengi@gmail.com

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