Dynamic Metal-Organic Framework/Polymer Hybrid Microcapsules for Self-Healing Anticorrosion Coatings

Guoliang Li*, Yan Song

State Key Laboratory of Chemical Resource Engineering, Beijing University of 6 Chemical Technology, Beijing 100029, China

Presenter's e-mail address: glli@buct.edu.cn

Abstract： An ideal microcapsule effectively preserves active molecules and can rapidly release it to elicit a self-healing anticorrosion function. However, the development of highly efficient microcapsules remains a great challenge. Herein, polymer/metal-organic framework hybrid microcapsules with dynamic properties were constructed as self-healing anticorrosion coatings. The shell of the microcapsule consisted of flexible polydopamine and a hard crystalline zeolitic imidazolate framework-8 layer. The corrosion inhibitor 8-hydroxyquinoline was trapped in the microcapsules and remained unreleased because the ZIF-8 layer acted as a molecular sieve. When the coating was surrounded by an acidic environment, the ZIF-8 nanocrystals in the shell dissociated, followed by the release of corrosion inhibitor. A dense protective layer was formed on the steel surface to suppress extensive corrosion propagation. In contrast to conventional coatings, the novel dynamic hybrid microcapsules enable the application of self-healing coatings that can withstand harsh acidic environments without human intervention.

Keywords Self-healing, Hybrid microcapsules, Anticorrosion

Reference

[1] Xiao, W. Y.; Song, Y.; Li, C.; Yao, Q. W.; Li, G. L. Macromol. Rapid Commun. 2024, 2400333.

[2] Kong, A. N.; Si, L. L.; Chen, D. X.; Song, Y.; Li, G. L. Macromol. Rapid Commun. 2024, 2400674.

[3] Song, Y.; Kong, A. N.; Chen, D. X.; Li, G. L. npj Materials Degradation 2023, 7, 67.