Digital twin based intelligent assessment of materials corrosion by using self-driving experimental cabins

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Abstract The protection and maintenance of material corrosion have always been a significant part of the national economy, and evaluating the corrosion performance of materials has always been a laborious task. Due to corrosion in different service environments, materials will exhibit different corrosion phenomena and mechanisms, which poses great challenges to the evaluation of their corrosion performance. At present, most evaluation methods are based on monitoring and testing data for analysis and evaluation, lacking a material corrosion service performance evaluation method that can truly combine monitoring data with real-time correction and evolutionary reasoning of material corrosion mechanism models.

Digital twin technology provides a method for evaluating the corrosion service performance of materials, which includes establishing a corrosion data sensing system and constructing a corrosion information database. Using online environmental data and reprocessing data from multiple materials as inputs for the corrosion intelligent digital mechanism model, this technology provides life prediction for the corrosion performance of service materials and achieves digital twin of material corrosion service performance. This work takes the evaluation of the corrosion service performance of aluminum alloys as an example.

Keywords Corrosion assessment, Digital twin, Data perception, 3D visualization, Aluminum alloy.

Reference

[1] Kewei Gao, Luchun Yan, Baoyu Cai, et al. A method for evaluating the corrosion service performance of materials based on digital twins :202211665637.