

Multi-scale Assessment and Prediction of Metal corrosion —— Introduction of the Corrosion Assessment and Prediction Laboratory (CAPLab)

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First, a brief introduction to the major national scientific research infrastructure - the Materials Service Safety Assessment Facility (MSAF, with an investment of 505.1 million yuan) is provided. This facility is a large-scale, coupled, extreme and serialized group of test facilities composed of six major test facilities and their supporting simulation and shared systems, which can reproduce the typical failure forms of materials to large/full-scale components/equipment in key industries. Among MSAF, the Corrosion Assessment and Prediction research group (CAPLab) has constructed a set of Atmospheric Environment Test Facility for Engineering Structures (AETFES) with the coupled control of seven environmental factors. In addition, it has accumulated multi-scale experimental evaluation, sensor and monitoring system development, modeling and simulation, as well as the prediction capabilities for the performance of materials/components/equipment. Relying on the national major scientific infrastructure, the CAPLab has provided support to various industries for the safe service and life extension of those key equipment. It has undertaken and completed high-quality reliability evaluation and life prediction of important equipment/key components in complex/extreme working conditions in key areas such as neutron absorption equipment for wet storage of spent nuclear fuel in nuclear power plants, dry storage tanks, high-pressure hydrogen transmission pipelines, and the hydrogen fuel system of the main torch for the 2022 Beijing Winter Olympics, etc.

Graphical Abstract

