Standardization in Biocorrosion Management in Gas and Hydrogen Storage – Status quo and Recent Developments

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Global corrosion costs are estimated to be EUR 2.3 trillion, which makes 3–4% of each nation's gross domestic product (GDP) [1]. Of this total corrosion, microbiologically influenced corrosion (MIC) is estimated to account for approx. 20 % of the global corrosion costs – equivalent to annual costs of 100 billion EUR for Europe alone [2].

These numbers derive from mostly natural gas-driven economy with only minimal hydrogen impact. If hydrogen is introduced in existing gas storage infrastructure, corrosion issues may thrive tremendously. The reason for that is simple: hydrogen is not only a valuable energy carrier for us, but also the most desired substrate for microbial metabolic processes in anaerobic systems. Sulfate-reducing bacteria (SRB) are well known to convert hydrogen to H_2S in the presence of specific sulfur compounds and are therefore major players in biocorrosion. Nevertheless, also other microorganisms like methane-producers or acid producers contribute to corrosion processes and are often neglected.

In the US, associations such as NACE International or AMPP (Association for Materials Protection and Performance) have developed and integrated standards and guidelines regarding MIC. However, Europe is lacking most of these standards or is technically not able to integrate many of the given structures. The heavy use of chemicals and the application of environmentally problematic substances need to be carefully reconsidered.

Therefore, it is important that Europe needs to set its own standards in MIC mitigation and monitoring. Working with oxygen-sensitive, living microorganisms from high-pressure infrastructure is a challenging combination, but with the development of innovative technical solutions and an interdisciplinary approach, we can establish European standards before biocorrosion takes over in hydrogen-rich systems.

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