Unveiling the effect of magnetite on the synergistic action of deposits and microorganisms on carbon steel corrosion

# Supplementary material

**Table S1.** *p*-value calculated from the one-way ANOVA test and Tukey's posthoc test for multiple comparisons of average corrosion rates among the corrosion scenarios.

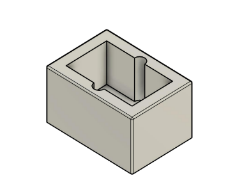
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Blank** | **Magnetite** | **Sand** | **Consortium** | **C + M** | **C + S** |
| **Blank** |  | 0.0031 \* | 0.9486 | 0.5308 | 3.21E-12 \* | 0.0069 \* |
| **Magnetite** | 7.087 |  | 0.0008 \* | 0.05838 | 1.22E-11 \* | 0.9959 |
| **Sand** | 1.22 | 8.306 |  | 0.1687 | 2.75E-12 \* | 0.0017 \* |
| **Consortium** | 2.468 | 4.619 | 3.687 |  | 4.48E-12 \* | 0.1282 |
| **C + M** | 47.23 | 40.14 | 48.45 | 44.76 |  | 9.96E-12 \* |
| **C + S** | 6.404 | 0.6824 | 7.624 | 3.937 | 40.82 |  |

Tukey's Q is below the diagonal, and p values are above the diagonal. Significant comparisons: p ≤ 0.05 = \*

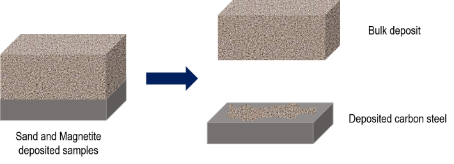
**Table S2.** *p*-value was calculated from the one-way ANOVA test and Tukey's post-hoc test for multiple comparisons of pitting rates among the corrosion scenarios.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Blank** | **Magnetite** | **Sand** | **Consortium** | **C + M** | **C + S** |
| **Blank** |  | 0.9606 | 0.9752 | 0.0475\* | 1.53E-07\* | 0.0004\* |
| **Magnetite** | 1.142 |  | 0.6533 | 0.1756 | 3.09E-07\* | 0.0016\* |
| **Sand** | 1.022 | 2.165 |  | 0.0140\* | 8.43E-08\* | 0.0001\* |
| **Consortium** | 4.793 | 3.65 | 5.815 |  | 3.77E-06\* | 0.1159 |
| **C + M** | 19.08 | 17.94 | 20.1 | 14.29 |  | 0.0001\* |
| **C + S** | 8.819 | 7.677 | 9.841 | 4.026 | 10.26 |  |

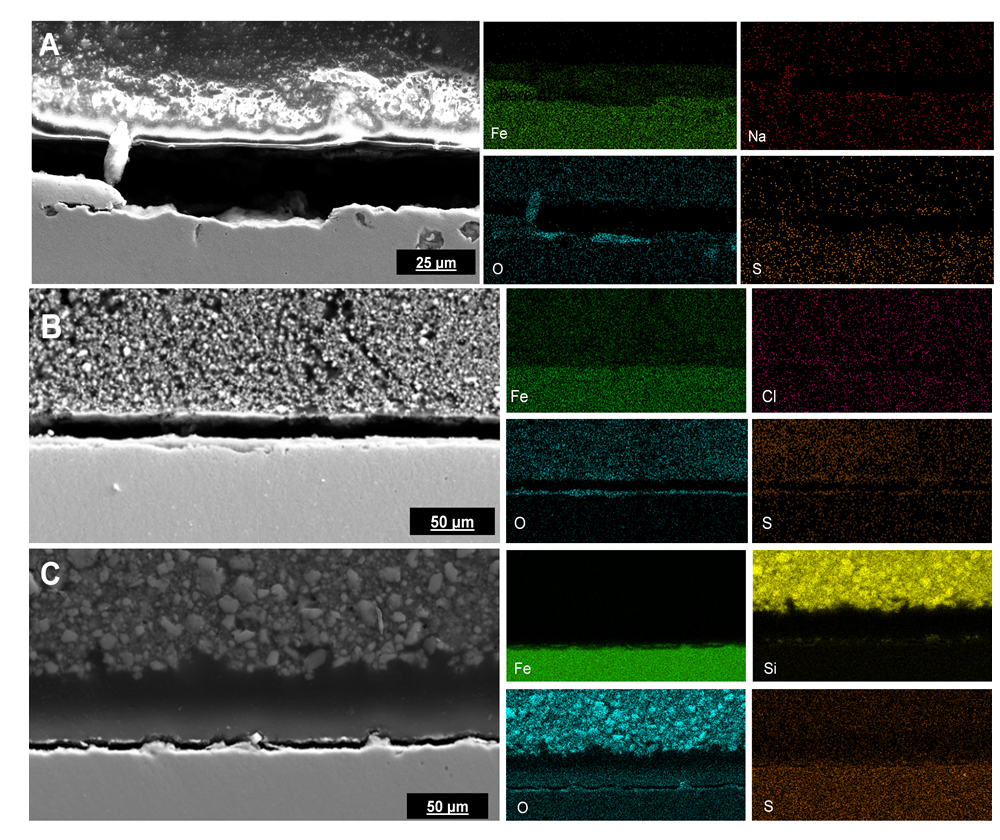
Tukey's Q is below the diagonal, and p values are above the diagonal. Significant comparisons: p ≤ 0.05 = \*



**Figure S1.** 3D printed sample holders used to assess under-deposit corrosion and under-deposit microbial corrosion.



**Figure S2**. Schematic separation between deposited metal and bulk deposit for microbial analyses.



**Figure S3.** SEM-EDS images from cross-sectioned coupons exposed to abiotic conditions. A. Metal sample exposed to the test solution (Blank). B. Metal sample exposed to magnetite, M. C. Metal sample exposed to sand, S.