SUPPLEMENTARY MATERIAL

Effect of Sulphate-Reducing Bacteria Activity on the Performance of Thermally Sprayed Aluminium and Polyurethane Coatings

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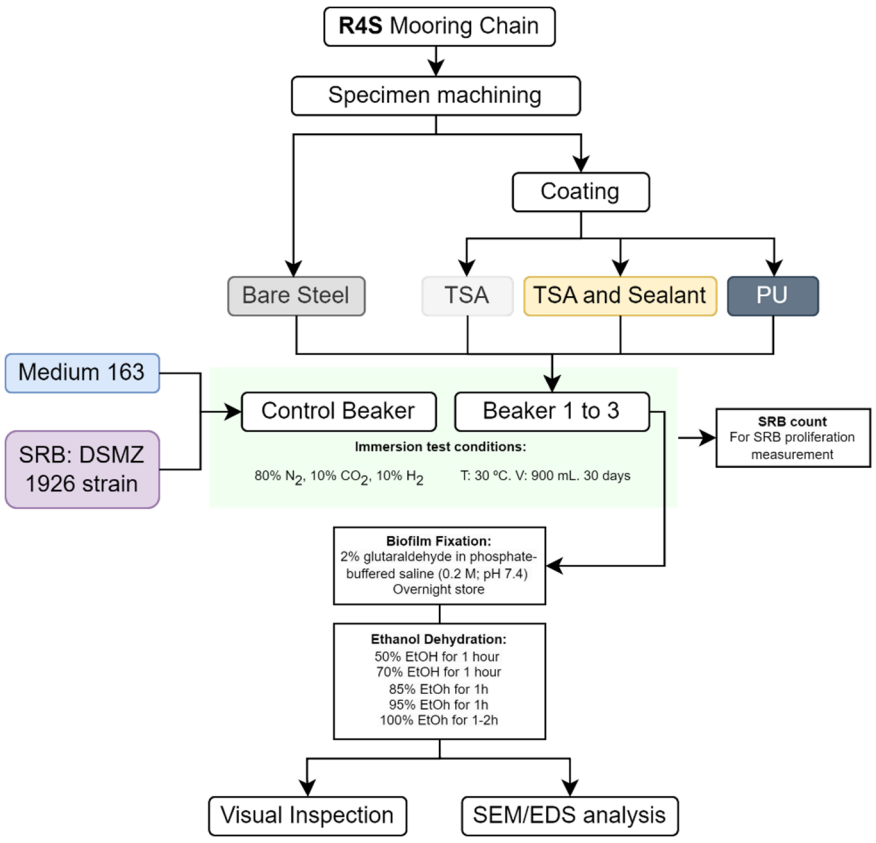

Diagram D1. Scheme of the experimental process employed for preparation, testing and characterization of the samples.

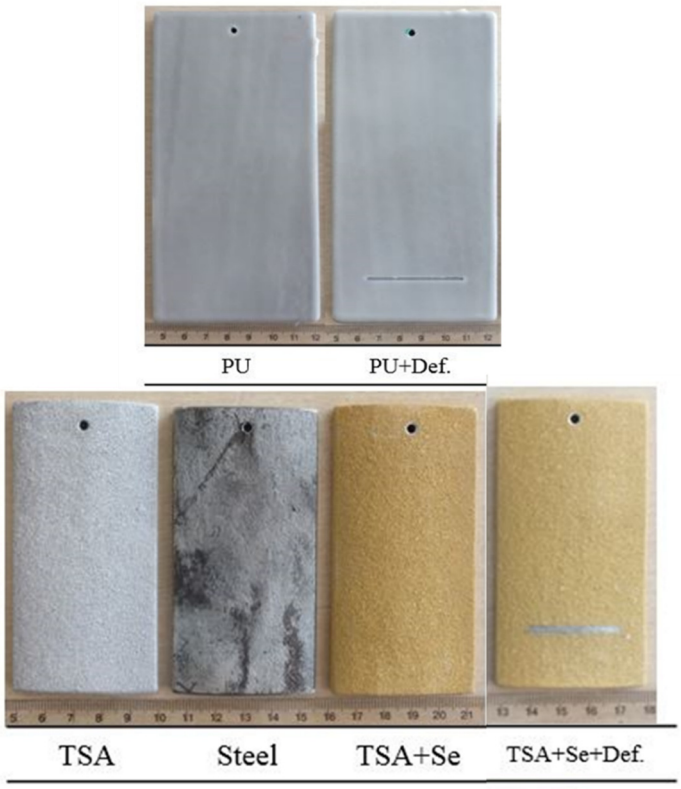

Figure S1. On top, Polyurethane sample (PU) and both PU+Defect references before the immersion test. In the bottom, TSA, Steel and TSA+Sealant references' appearance as received and TSA+Sealant+Defect before the immersion test.

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DSMZ

Certificate of Origin and Analysis

We declare that the DSMZ cultures within this delivery no. **A1801871-1 (invoice no. 01803062-1)**

DSM-No. Strain	Lot.-No.	Risk Group
1926 Desulfovibrio desulfuricans	DSM 1926-1004-001	1

√ are authentic DSMZ cultures derived directly from these strains held in the DSMZ
√ have been produced in DSMZ laboratories at the address given below
√ are of German preferential origin
√ have been tested by DSMZ control procedures with respect to purity and identity

Viability
From all strains provided for deposit, viability and purity are tested by subculturing. Each batch produced is again checked for viability after preservation, and after intervals scheduled for the different taxa.

Purity
Purity of each batch preserved is checked after production. This check may include microscopical and macroscopical observations or selected physiological, chemosystematic or molecular based tests.

Authenticity
Each strain is checked by the most significant techniques available for this purpose and the taxon in question. The following options are available for identity checks:

- morphology and growth behaviour
- physiological properties including API® kits or BIOLOG™ substrate plates
- selected strain-specific phenotypic/genotypic markers, e.g. resistances, sensitivities, plasmid-encoded properties
- chemotaxonomic markers such as whole cell fatty acid patterns
- molecular based techniques such as gene sequencing (16S rRNA, house keeping genes), automated RiboPrinting®
- MALDI-TOF MS

The DSMZ is not in a position to verify specific properties or applications claimed for a strain in the literature. The DSMZ is not responsible for differences between the properties of the strain deposited in the DSMZ and properties given in the literature/databases

Storage of ampoules: We recommend cold, dry storage in the dark. Freeze-dried cultures should be stored between 4- 8°C. According to our Terms & Conditions, the material is to be used immediately upon receipt. Strains are supplied for laboratory use only.

The batches indicated above passed our quality control system.

Date: 20 March 2018

Quality Management Representative, Leibniz-Institut DSMZ GmbH

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Figure S2. Certificate of Origin and Analysis of DSMZ 1926 Desulfovibrio Desulfuricans culture.

163. MARINE DESULFOVIBRIO (POSTGATE) MEDIUM

Solution A:		
NaCl	25.0	g
K_2HPO_4	0.5	g
NH_4Cl	1.0	g
Na_2SO_4	1.0	g
$CaCl_2$ x 2 H_2O	0.1	g
$MgSO_4$ x 7 H_2O	2.0	g
Na-DL-lactate	2.0	g
Yeast extract	1.0	g
Na-resazurin solution (0.1% w/v)	0.5	ml
Distilled water	980.0	ml
Solution B:		
$FeSO_4$ x 7 H_2O	0.5	g
Distilled water	10.0	ml
Solution C:		
Na-thioglycolate	0.1	g
Ascorbic acid	0.1	g
Distilled water	10.0	ml

Bring *solution A* to the boil, then cool to room temperature while sparging with 100% N_2 gas. Add *solutions B* and *C*, adjust pH to 7.8 with NaOH, and distribute under N_2 gas atmosphere into anoxic Hungate-type tubes. During distribution continuously swirl the medium to keep the grey precipitate suspended. Autoclave 15 min at 121°C. Adjust pH of the complete medium to 6.8 - 7.0, if necessary.

For DSM 10520 adjust final pH of autoclaved medium to 7.5 using a sterile anoxic stock solution of Na_2CO_3 (5% w/v) prepared under 80% N_2 and 20% CO_2 gas atmosphere.

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Figure S3. Marine Desulfovibrio (Postgate) Medium specifications.

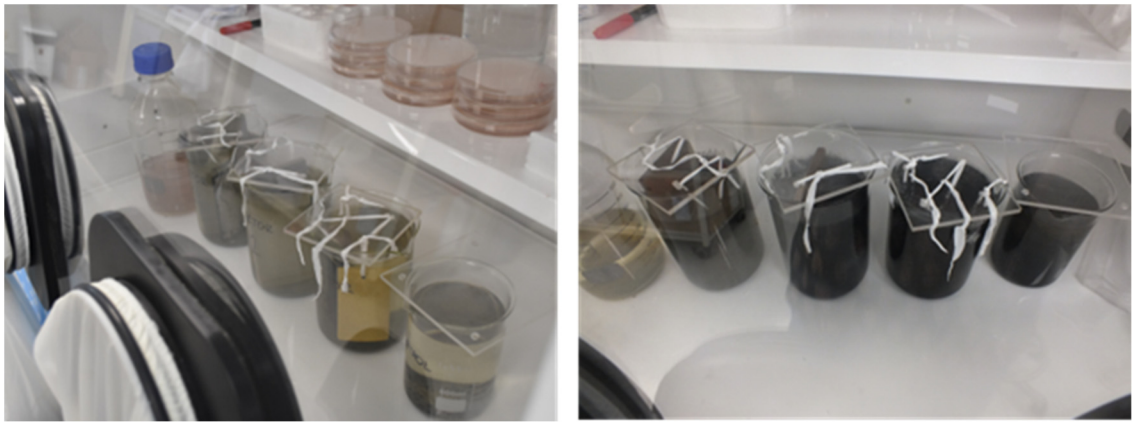

Figure S4. Appearance of the beakers once the SRB are inoculated, left, (t=0 days) and after 4 days of immersion test, right.

Figure S5. Aspect of beaker 3 references prior to dehydration and biofilm fixation process.

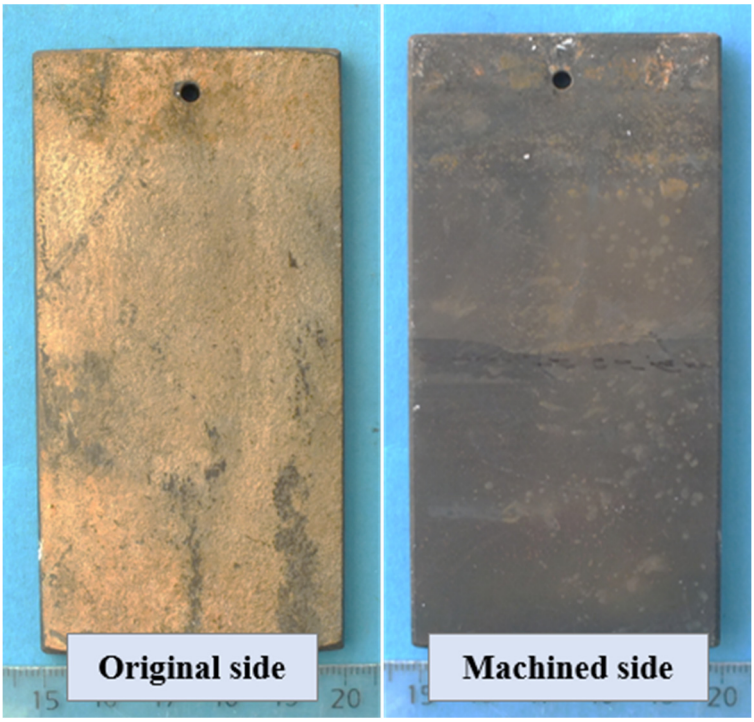

Figure S6. Steel reference appearance after immersion test, both original and machined sides.

Figure S7. TSA reference appearance after immersion test, both original and machined sides.

Figure S8. TSA+Se reference appearance after immersion test, both original and machined sides.

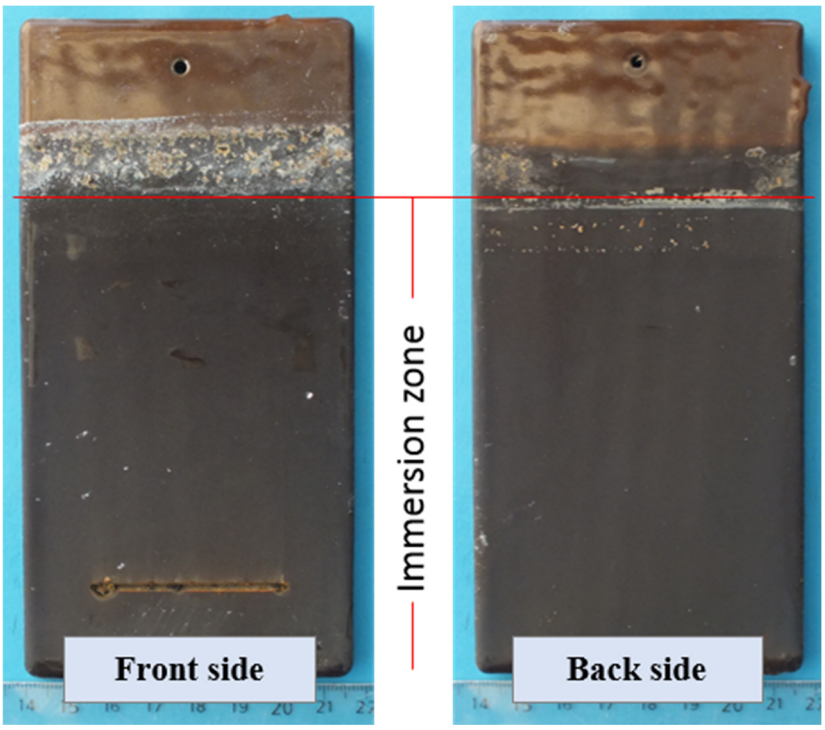

Figure S9. Polyurethane reference appearance after immersion test, both original and machined sides.

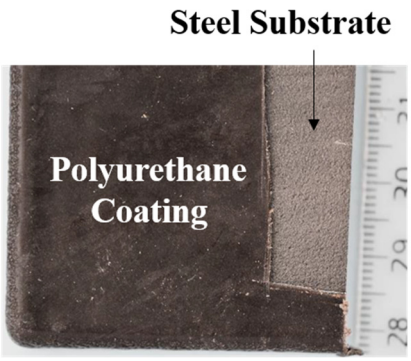

Figure S10. Polyurethane reference appearance after immersion test, with PU topcoat removal, unveiling the intact Steel substrate.

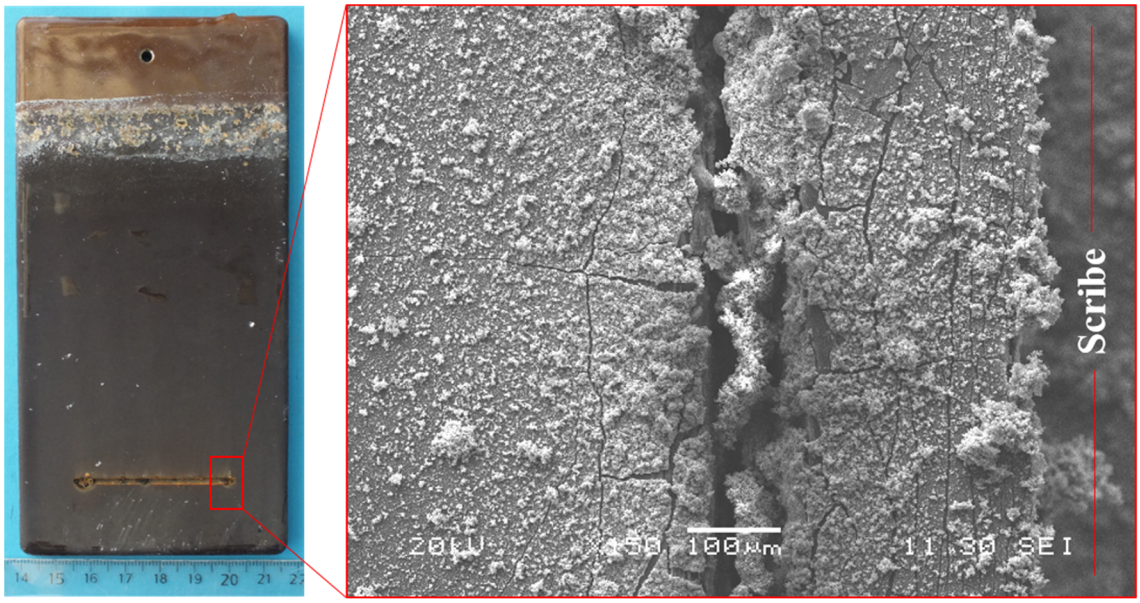

Figure S11. Micrography at x150 magnification showing attached biofilm in the scribe edge of PU sample.

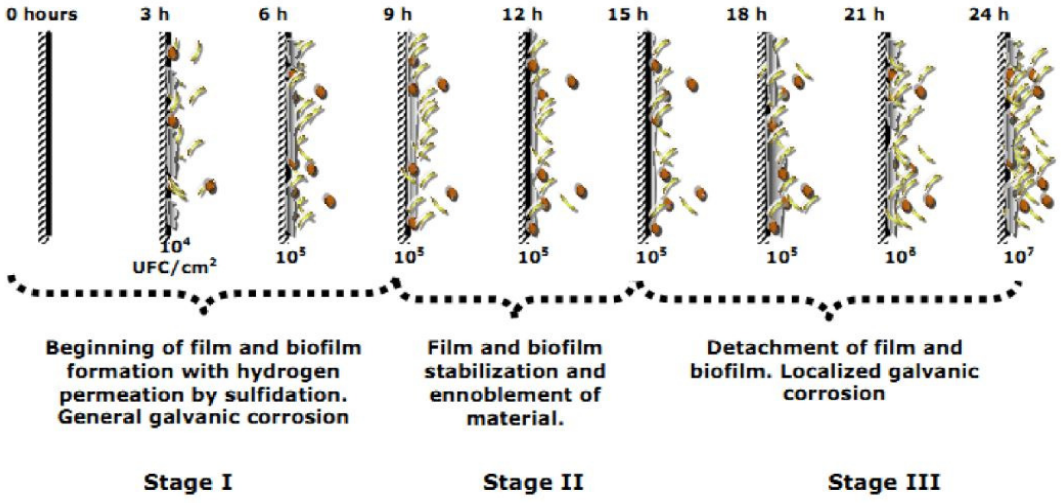

Figure S12. Mechanism of biofilm formation related to SRB activity and concentration.

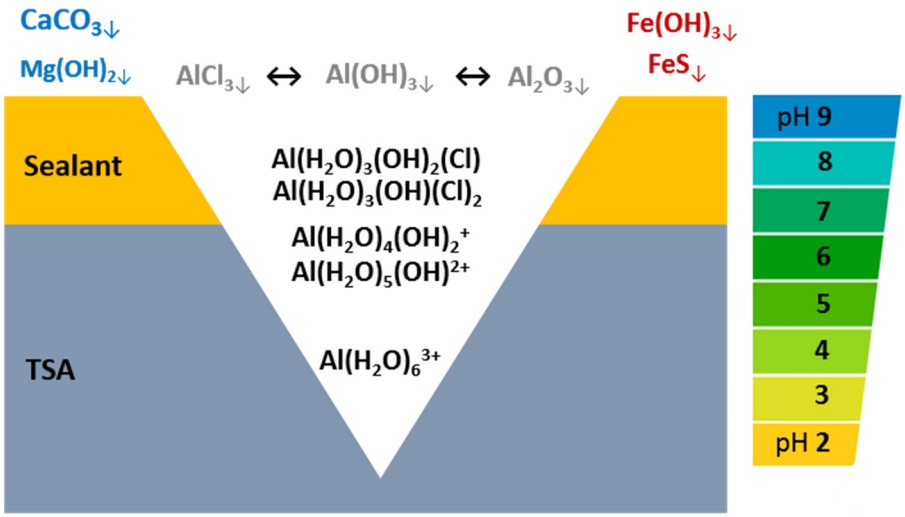

Figure S13. Most stable species as function of the established pH between the pit tip and the pit mouth and bold surface.

Table S1. Summary table of semi quantitative EDS chemical analysis of tested samples.

Reference Spectrum	Surface	C	O	Na	Mg	Al	Si	P	S	Cl	Ca	Ti	Cr	Mn	Fe	Ni
Steel Blackish area	O	14.65	21.28			0.87	0.56		15.97	0.86		0.70	1.73		41.84	1.54
Steel Whitish area	O		35.37			1.09	1.73		4.25	13.42	0.54	28.95			14.65	
Steel Pit	M	13.78	13.15						1.51				2.95	2.17	66.44	
TSA Yellow surface	M	26.91	20.91	0.58		39.77			4.27						7.55	
TSA White corrosion products	M	24.82	25.39			35.22			4.36						10.20	
TSA+Se Yellow/brownish area	O	20.06	41.90		1.85	1.05	2.97		5.29	0.34		18.79			7.73	
TSA+Se White/brown corrosion products	O	19.15	49.77	2.18	1.19	14.53		7.60			1.03	3.61			0.96	
PU SRB exposed surface	M	46.96	37.56						2.03	1.36					12.09	
PU Reference	M	77.06	21.21						0.33	1.41						

Note: **O***:* Original Surface. **M***:* Machined Surface.