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Enhancing corrosion resistance of mild steel in hydrochloric acid with Chiquita banana sap extract

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Table S1. AS1020 steel compositions.

Chemical elements (wt.%)														
C	Mn	Si	S	P	Ni	Cr	Mo	Cu	V	Nb	Ti	Al	B	Fe
0.16	0.73	0.21	0.01	0.02	< 0.01	0.03	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.005	< 0.005	Bal.

Table S2. The concentrations of the compounds detected by Gas chromatography mass spectrometry (GC-MS) in Chiquita banana sap - water extract (BSWE).

Peak	R.T. min	Library	%Area	Quality
1	6.074	Spirohexan-5-one	6.50	35
2	10.630	Spirohexan-5-one	1.05	16
3	12.370	1,1-Bis(4-methoxyphenyl) ethene	0.13	7
4	14.919	1, 3, 5-Triazine, 2, 4, 6-tris(cyanomethoxy)-	0.36	10
5	19.777	Capsaicin	9.85	90
6	19.914	Dihydrocapsaicin	6.80	98

Table S3. Comparison between different plant extracts used as corrosion inhibitors for material in corrosion acid media.

Extract	Corrosion medium	Concentration	Inhibition performance (%)	Ref.
Velvet Tamarind	1.0 M HCl	50 % (v/v)	88.0	[43]
Ferula assa-foetida	2.0 M HCl	0.8 (g/L)	96.0	[44]
Dorema ammoniacum	2.0 M HCl	0.8 (g/L)	91.3	[44]
Pachylobus edulis	2.0 M H_2SO_4	0.5 (g/L)	48.0	[45]
Azadirachta indica gum	1.0 M HCl	60 (ppm)	81.7	[46]
Boswellia serrata gum	1.0 M HCl	500 (ppm)	95.5	[47]
Canarium schweinfurthii tree	0.1 M HCl	0.1 (g/L)	90.4	[48]
Guar gum	1.0 M 2.0 H_2SO_4	1500 (ppm)	93.4	[49]
Locust Bean Gum	0.5 M H_2SO_4	5 (mM)	89.8	[50]
Musa Paradisiaca Stem Sap	0.5 M HCl	50 % (v/v)	87.1	[51]
Chiquita banana sap	0.1 M HCl	2000 (ppm)	94.2	This work

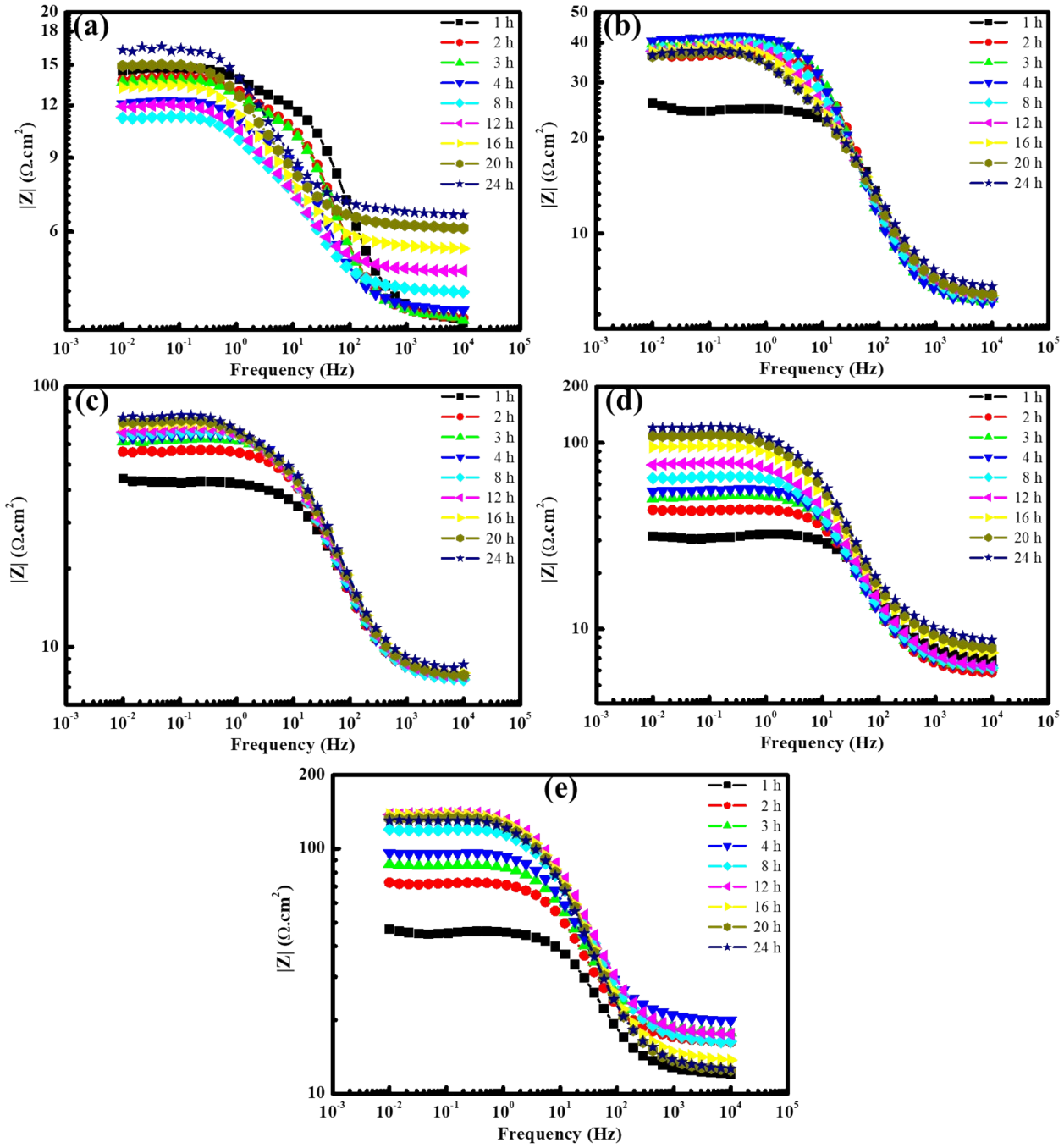


Figure S1. EIS results in the form of Bode plots (impedance vs frequency) of steel exposed to 0.1 M HCl solution containing (a) 0, (b) 500, (c) 1000, (d) 1500, and (e) 2000 ppm BSWE.

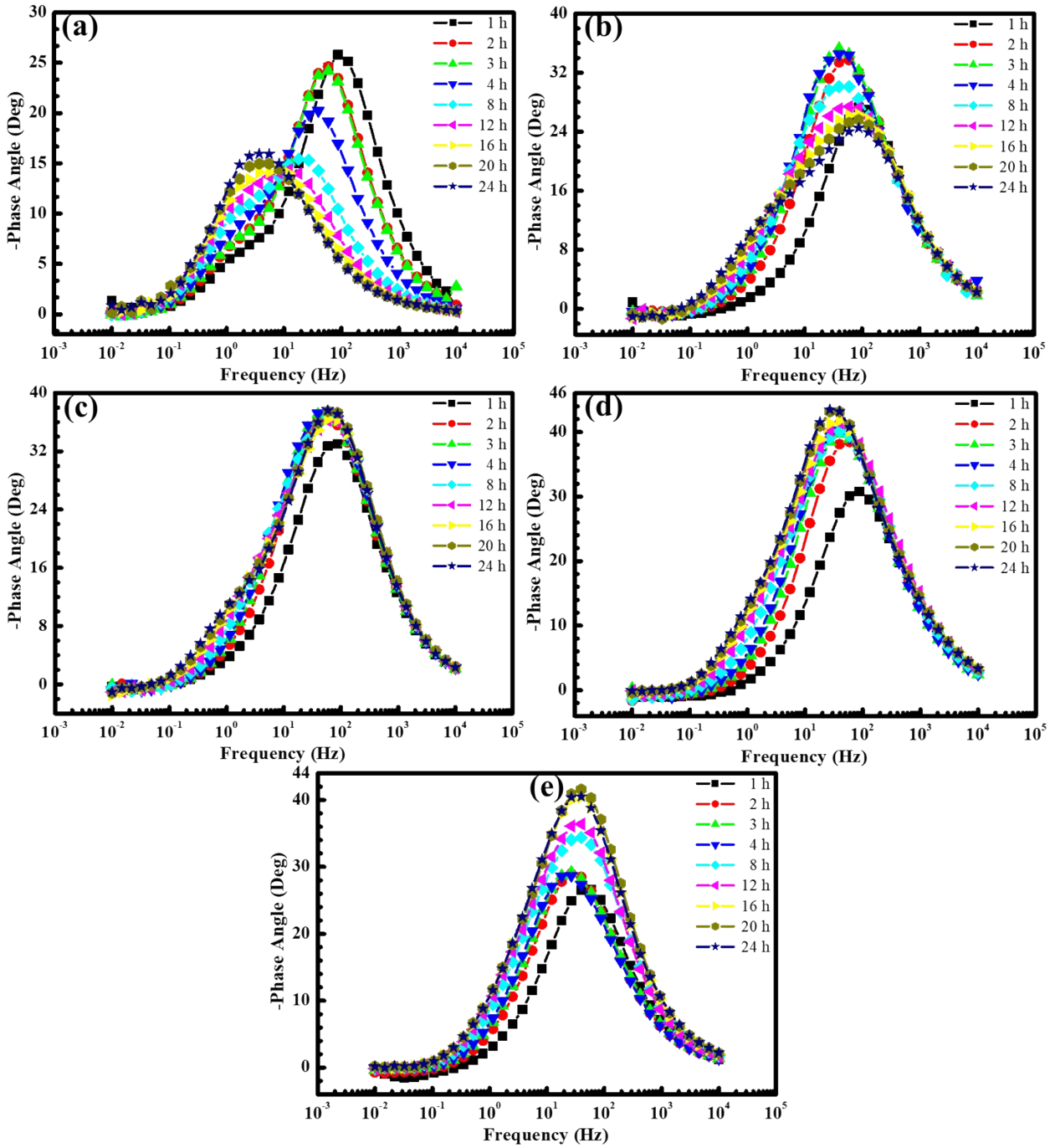


Figure S2. EIS results in the form of Bode plots (phase angle vs frequency) of steel exposed to 0.1 M HCl solution containing (a) 0, (b) 500, (c) 1000, (d) 1500, and (e) 2000 ppm BSWE.

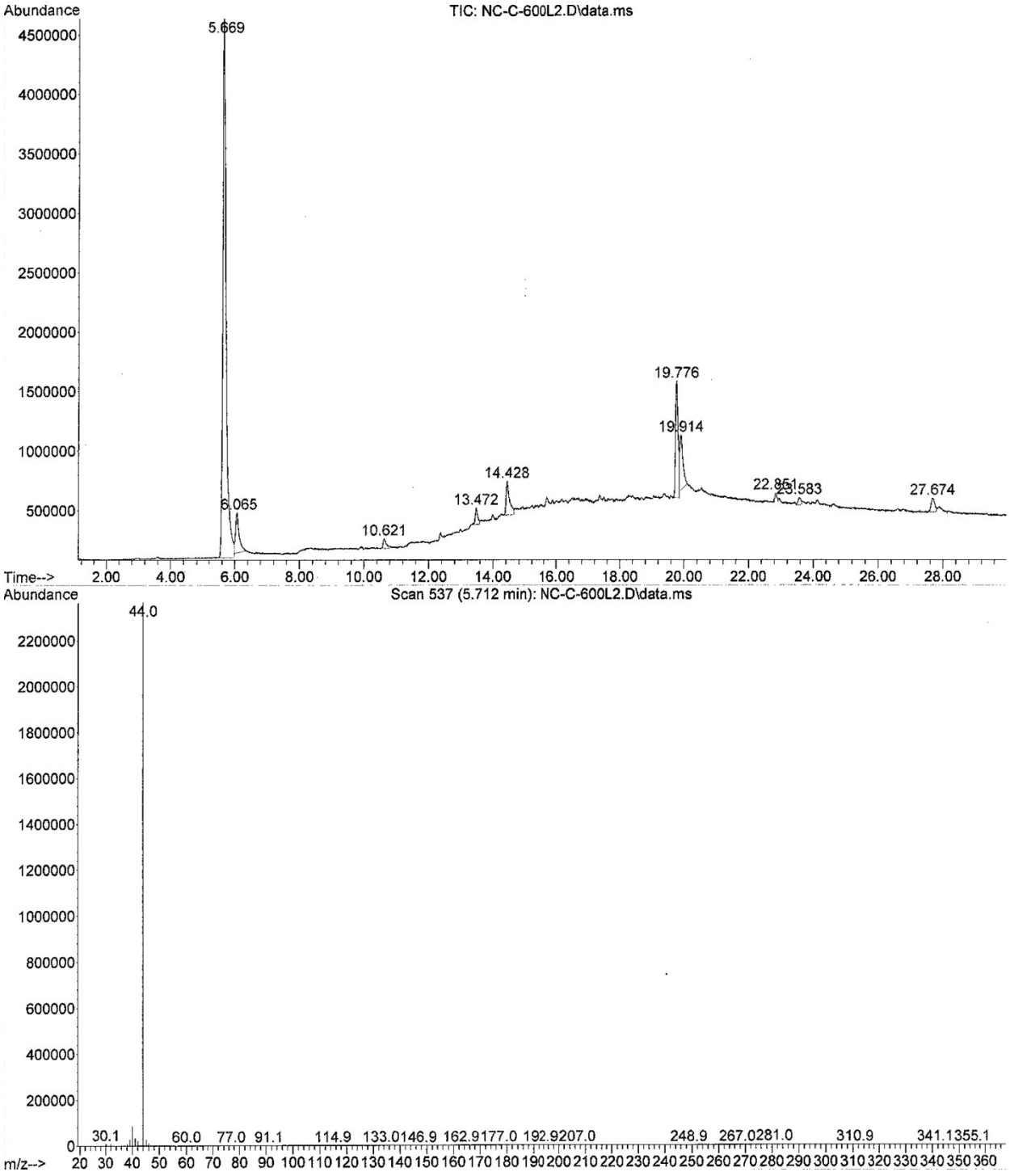
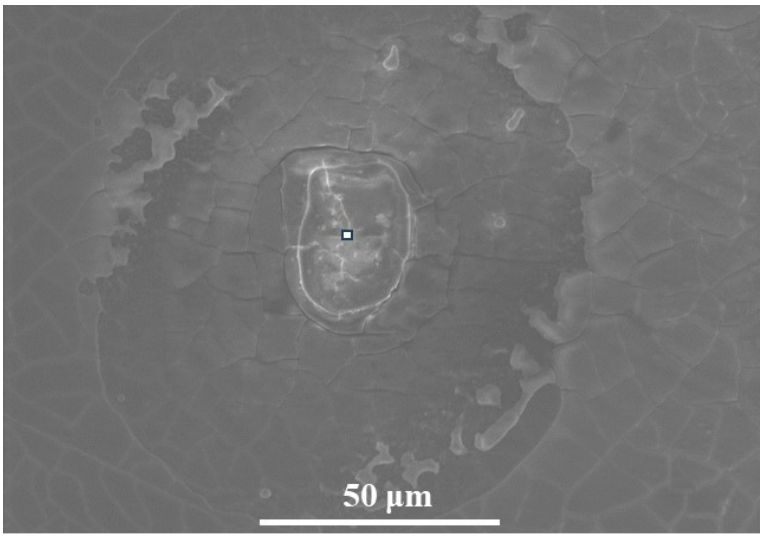
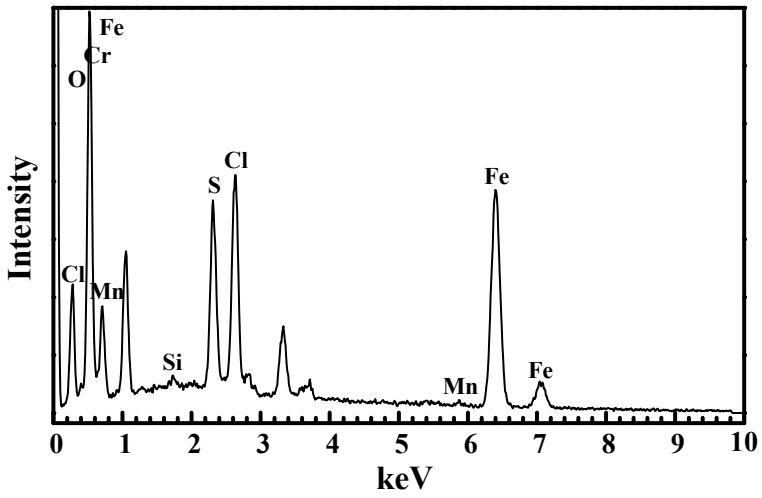


Figure S3. Gas chromatography–mass spectrometry result of Chiquita banana sap - water extract (BSWE) at 600 °C.



(a)



(b)

Figure S4. (a) SEM/EDS of AS1020 steel surface after 15 mins corrosion happen in 0.1 M HCl solution.