Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supplementary Information

Synergistic antioxidant and antibacterial effect of Zn-ascorbate metal-organic framework loaded with Marjoram essential oil

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Table S1. Composition of marjoram essential oil (MEO) as purchased (analyzed by GC-MS).

No.	Compound	t_R (min)	% Peak area
1	Thujene	8.11	1.27
2	α-Pinene	8.31	0.88
3	Camphene	8.79	0.04
4	**Sabinene**	**9.67**	**3.20**
5	2-β-Pinene	9.75	0.43
6	β-Myrcene	10.32	0.89
7	**α-Terpinene**	**11.19**	**4.38**
8	***o*-Cymene**	**11.52**	**15.00**
9	**D-Limonene**	**11.63**	**3.18**
10	Eucalyptol	11.70	0.21
11	**γ-Terpinene**	**12.74**	**7.82**
12	*m*-Cresol	13.58	0.12
13	α-Terpinolene	13.78	2.42
14	*cis*-Sabinene hydrate	14.13	2.28
15	Linalool	14.24	1.37
16	*cis*-*p*-Menth-2-en-1-ol	14.97	0.83
17	1-Terpineol	15.64	0.75
18	**Terpinene-4-ol**	**17.14**	**32.72**
19	*p*-Cymen-8-ol	17.32	0.91
20	**α-Terpineol**	**17.51**	**4.49**
21	Isopulegol	17.65	0.48
22	*trans*-*p*-Menth-1-en-3-ol	18.07	0.62
23	Linalyl anthranilate	19.76	2.64
24	1,8-Cineole	21.08	0.32
25	Carvacrol	21.36	0.44
26	4,4-Dimehtylpent-2-enal	21.92	0.58
27	*cis*-Carveol	23.52	0.15
28	Caryophyllene	25.12	2.54
29	(+)-Aromadendrene	25.72	0.11
30	1,4-Dihydroxy-*p*-menth-2-ene	26.95	0.47
31	Ledene	27.46	0.34
32	(+)-Spathulenol	30.03	0.67

33	(-)-Caryophyllene oxide	30.21	0.91
	Total identified		**93.46**

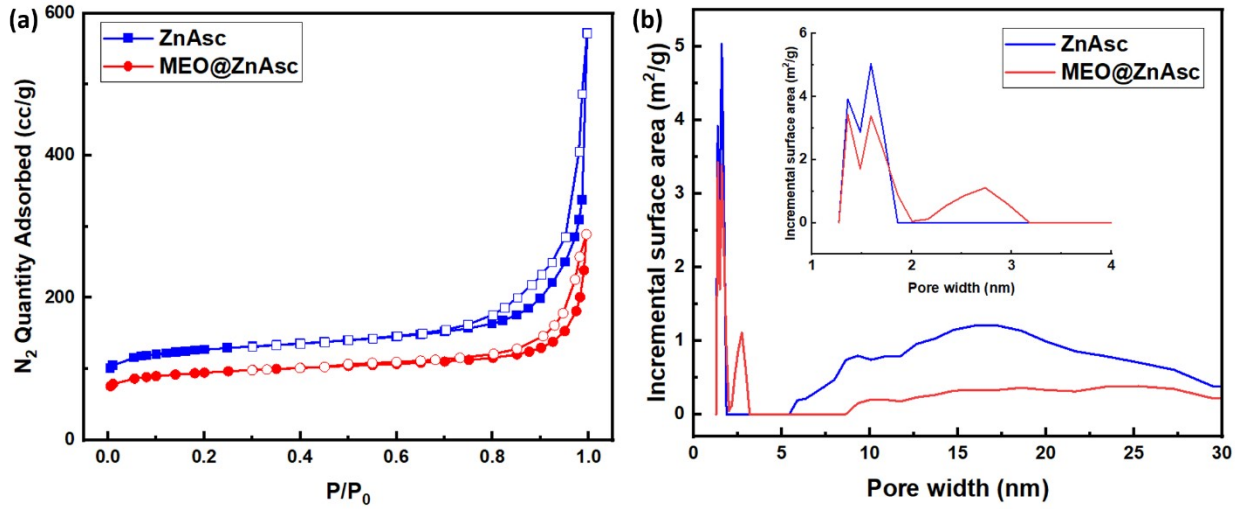

Figure S1. (a) N_2 sorption isotherms and (b) pore size distributions of ZnAsc and MEO@ZnAsc.

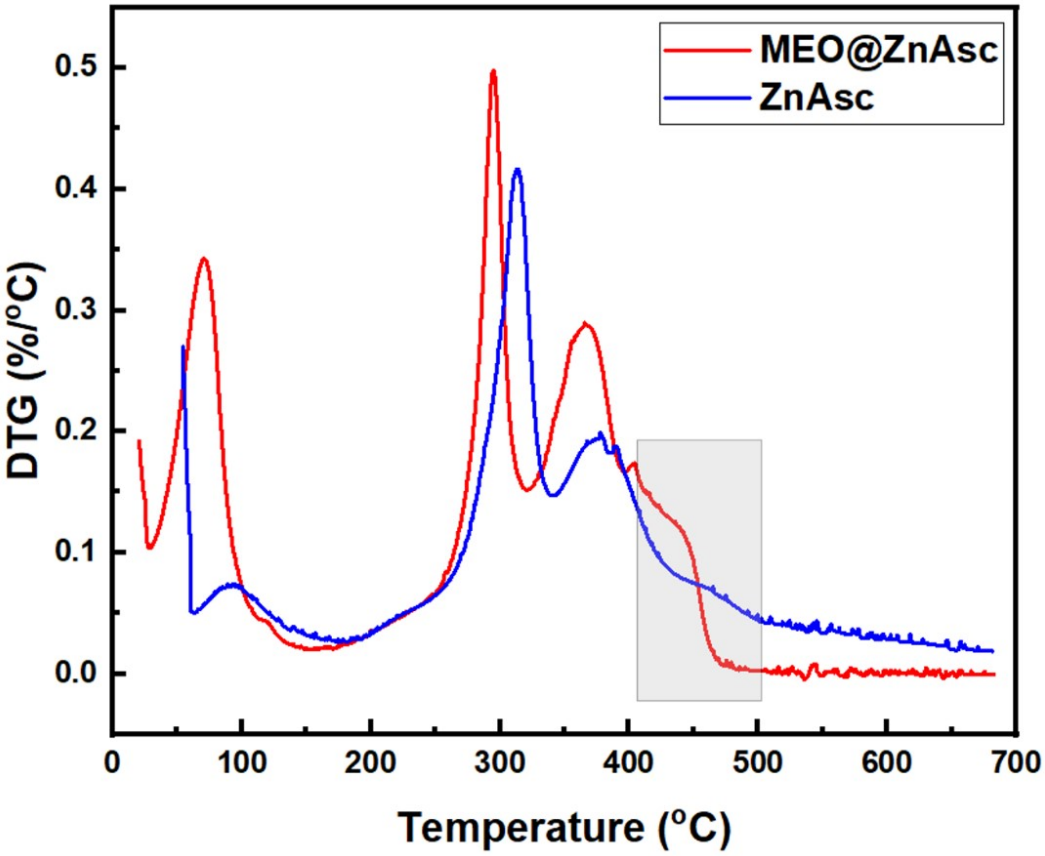

Figure S2. First derivative of the TGA profiles of ZnAsc and MEO@ZnAsc.

Table S2. Crystallite/particulate size determination by different methods (nm).

Method	ZnAsc	MEO@ZnAsc
SEM	20.9	23.3
TEM	18.6	18.1
XRD	16.5	15.6

Table S3. Antibacterial activities of Zn-based MOFs.

MOF	Inhibition zone diameter (mm)		Zn wt%	Ref.
	E. coli	*S. aureus*		
Zn-MOF	-	37.32	-	[1]
GR-MOF-8	15.96	20.20	29	[2]
Ac MOF-5	10	16	34	[3]
Ac Zn-MOF	14	16	26.4	[3]
Ac TMU-3	12	14	16.2	[3]
IEF-24	5.4	-	14.1	[4]
Zn-MOF	12.22	10.10	-	[5]
Zn-MOF	8.6	17	24.6	[6]
$[Zn(\mu\text{-}4\text{-}hzba)_2]_2 \cdot 4(H_2O)$	-	14.6	13.9	[7]
ZnAsc	**10.33**	**8**	**50**	**This work**

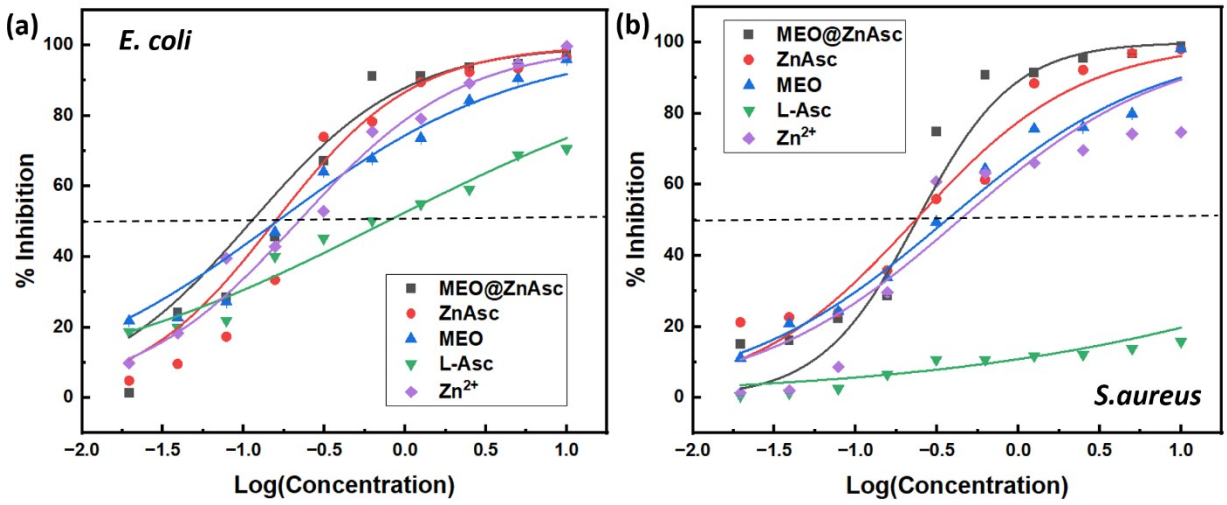

Figure S3. Dose response curves of the different samples against *E. coli* (a) and *S. aureus* (b) using broth microdilution method (dots represent experimental data and lines represent sigmoidal data fitting from which IC_{50} values were calculated).

References

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