Supplementary Data

Biological Entities of Green Factories for Nano-grafting Zinc Oxide: A comparative antibacterial mechanism

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Table S1. Chemicals and Reagents

Reagent	Supplier (By Sigma)
Distilled water	H_2O CAS Number 7732-18-5
Methanol	**Methyl alcohol** Linear Formula CH_3OH CAS Number 67-56-1 Purity ≥99.9%
Ethanol	Ethyl alcohol $CH3CH_2OH$ CAS Number: 64-17-5 Purity ≥99.9%
Sodium Hydroxide	Sodium hydroxide NaOH CAS Number 1310-73-2 Quality level: 100
Zinc Acetate	Zinc acetate dehydrate $Zn\ (CH_3CO_2)_2.2H2O$ CAS Number 5970-45-6 Quality level: 200
Agar	**Agar-agar** $(C_{12}H_{18}O_9)_n$ CAS Number 9002-18-0 Quality level: 200
Ciprofloxacin	Ciprofloxacin $C_{17}H_{18}FN_3O_3$ CAS Number: 85721-33-1 Purity ≥98%

Table S2. ZnO@F XRD Characteristics

Peak number	Pos (2q)	Intensity	FWHM Left (2q)	b (rad)	Size (nm)	Average size (nm)
1	31.35851	458.87	1.00256	0.017497	8.230254	
2	34.0114	420.43	0.94169	0.016435	8.821937	
3	35.83836	748.92	0.91496	0.015969	9.125319	
4	47.16095	191.12	0.97075	0.016946	8.929263	8.829227
5	56.24829	310.48	0.83375	0.014551	10.80403	
6	62.52638	260.75	0.86384	0.015076	10.75873	
7	67.78789	228.22	1.86378	0.032529	5.135054	

Table S3. ZnO@W XRD characteristics

Peak number	Pos (2q)	Intensity	FWHM Left (2q)	b (rad)	Size (nm)	Average size (nm)
1	31.00078	607.75	0.83276	0.014534	9.899779	
2	33.6797	713.69	0.61971	0.010815	13.39371	
3	35.50113	1026.37	0.79767	0.013921	10.45721	
4	46.83465	201.64	1.13529	0.019814	7.625679	9.113634
5	55.93558	355.40	0.96897	0.016911	9.282823	
6	62.20037	306.47	1.06095	0.018517	8.744837	
7	67.47547	288.82	2.17542	0.037968	4.391404	

Table S4. ZnO@C XRD characteristics

Peak number	Pos (2q)	Intensity	FWHM Left (2q)	b (rad)	Size (nm)	Average size (nm)
1	31.26066	728.74	1.04845	0.025280	7.868138	
2	33.93565	634.86	0.99102	0.017296	8.381115	
3	35.75082	1155.40	0.92893	0.016212	8.985867	
4	47.06456	306.84	1.0906	0.019034	7.945079	8.322056
5	56.17364	357.95	0.93599	0.016336	9.62054	
6	62.46179	361.51	0.88909	0.015517	10.44961	
7	67.78278	277.92	1.91252	0.033379	5.004039	

Table S5. Inhibition zones zinc oxide on bacterial strains

ZnO NP	***E. coli***			***S. aureus***		
	10 mg	20mg	40mg	10 mg	20mg	40mg
ZnO@W	9mm	9mm	12mm	9mm	10mm	13mm
ZnO@C	6mm	8mm	10mm	7.5mm	8mm	12mm
ZnO@F	7mm	8mm	10mm	7mm	9mm	10mm
Control	13mm	13mm	13mm	11mm	11mm	11mm

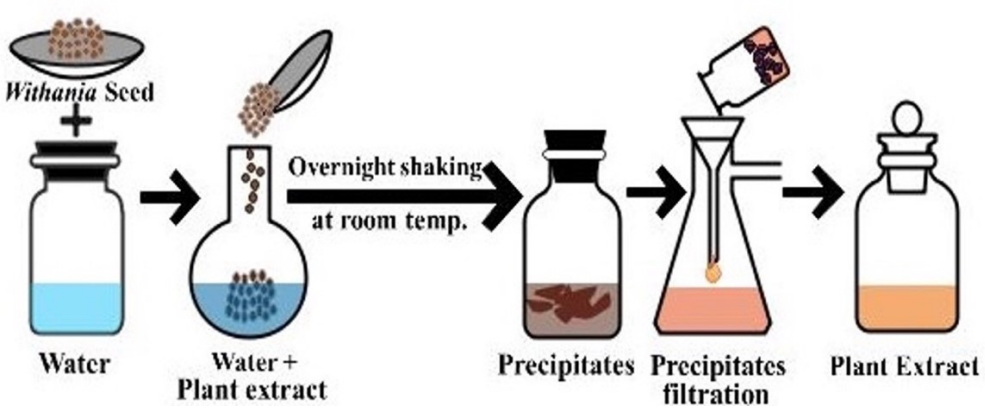

Figure S1. Preparation of *Withania coagulans* Extract

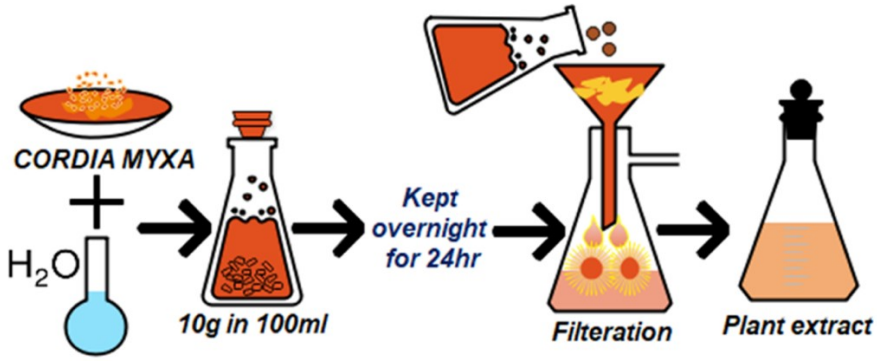

Figure S2 Preparation of *Cordia myxa* Extract

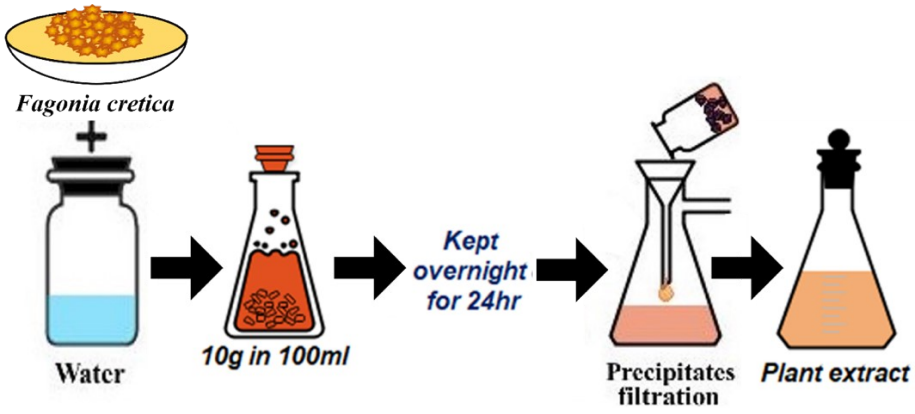

Figure S3 Preparation of *Fagonia cretica* Extract

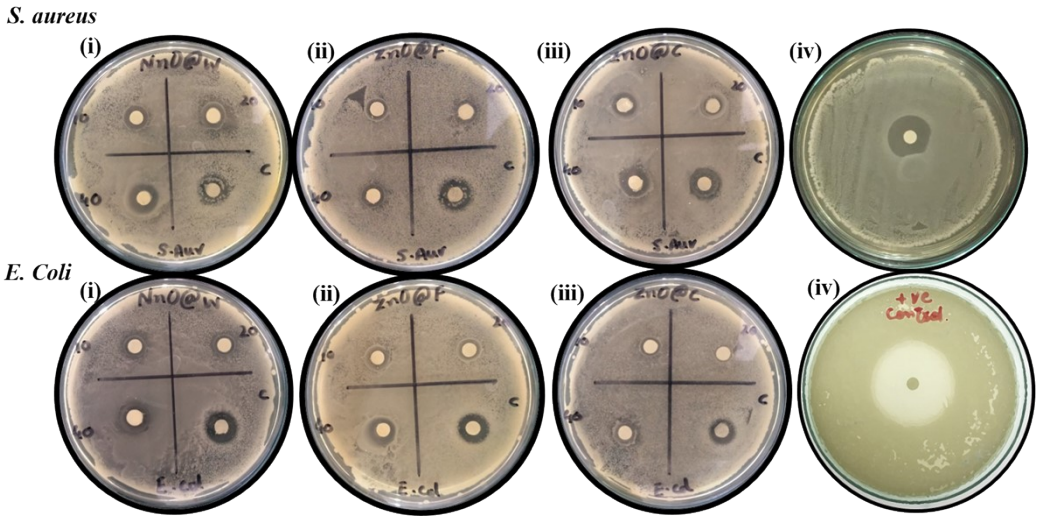

Figure S4 Antibacterial plate photos of ZnO nanoparticles prepared from *W. coagulans* (ZnO@W) *C. myxa* (ZnO@C) and *F. cretica* (ZnO@F)