Supplementary File

Study of curcumin antioxidant activities in robust oil-water nanoemulsions

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Table S1

T/K	ρ^{lit} g cm^{-3}	n	t sec	η^{lit} $\pm10^{-4}$mPa.s	γ^{lit} $\pm10^{-2}$mN/m	K_η	K_γ
298.15	0.997044[a]	121	90.81	0.8937[d]	71.97[c]	0.00987	8806.05
		122	90.81			0.00987	8806.05
		122	90.82			0.00987	8806.05
		122	90.81			0.00987	8806.05
		122	90.82			0.00987	8806.05
303.15	0.995646[a]	125	81.75	0.8007[d]	71.18[c]	0.00984	8936.09
		125	81.75			0.00984	8936.09
		125	81.74			0.00984	8936.09
		125	81.75			0.00984	8936.09
		124	81.75			0.00984	8936.09
308.15	0.994030[b]	128	75.56	0.7225[d]	70.38[c]	0.00962	9061.25
		128	75.57			0.00962	9061.25
		129	75.56			0.00962	9061.25
		128	75.57			0.00962	9061.25
		128	75.56			0.00962	9061.25

Uncertainties in density, surface tension and viscosity measurements are less than ±2 x 10^{-6}g.cm^{-3}, ±10^{-2}mN/m and ±10^{-4}mPa.s respectively, with temperature uncertainties of ±0.01K.

[a] Reference [1]
[b] Reference [2]
[c] Reference [3]
[d] Reference [4]

[1] Handbook of Chemistry and Physics, 53rd Ed., p. F4, Updated by C.R. Snelling, 6/14/08.

[2] Lange, p. 1199. Due to the old definition of liter used at the time, the data from the Handbook was converted from old g/ml to g/cm^3, by multiplying by 0.999973.

[3] Lange, p. 1663. Due to the old definition of liter used at the time, the data from the Handbook was converted from old g/ml to g/cm^3, by multiplying by 0.999973.

[4] David R. Lide, CRC Handbook of Chemistry and Physics CRC Press, 2004, p. 6-201;ISBN 0849304857.

Table S2

Sr. No.	Fatty acid	% Content
	Peanut oil	
1.	Oleic acid	46.8
2.	Linoleic acid	33.4
3.	Palmitic acid	10
	Linseed oil	
1.	Palmitic acid	6.58
2.	Stearic acid	4.43
3.	Oleic acid	18.51
4.	Linoleic acid	17.25
5.	Linolenic acid	53.21
	Mustard oil	
1.	Myristic acid	0.58
2.	Palmitic acid	1.74
3.	Palmitoleic acid	0.17
4.	Stearic acid	1.04
5.	Oleic acid	9.56
6.	Linoleic acid	13.31
7.	Linolenic acid	11.10
8.	Eicosanoic acid	6.36
9.	Eicosadienoic acid	---
10.	Behenic acid	1.65
11.	Erucic acid	42.16
12.	Lignoceric acid	2.23

Table S3

	RSA		RSA	
Oil	Oil-curc	σ	Eth-curc	σ
Linseed oil	11.75	±0.004	5.13	±0.002
Mustard oil	12.29	±0.005	2.98	±0.003
Peanut	8.27	±0.002	4.23	±0.001

RSA= radical scavenging activity,curc: curcumin.

Table S4

Oil-curc (mL)	SDS	DTAB	Tw-20	Tw-40
		Peanut oil		
0.027	6.42	6.93	5.63	6.42
0.054	7.05	7.07	4.01	6.26
0.081	7.42	6.57	5.72	6.23
0.128	7.04	6.75	5.39	6.02
0.135	6.89	7.29	5.71	5.46
		Linseed oil		
0.027	5.35	5.51	5.30	5.72
0.054	5.42	4.56	5.01	5.56
0.081	4.68	4.58	5.26	5.47
0.128	5.49	4.57	5.11	4.46
0.135	5.34	4.59	4.70	4.53
		Mustard oil		
0.026	6.56	7.49	5.53	4.49
0.052	6.17	6.89	5.15	4.27
0.078	6.85	6.39	5.11	4.58
0.104	7.12	6.42	5.34	4.24
0.130	6.96	5.88	5.28	4.39

SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.

Table S5

T/K	Peanut oil	Linseed oil	Mustard oil
298.15	0.909071	0.930597	0.913036
303.15	0.906313	0.927179	0.911627
308.15	0.902305	0.923684	0.904799
	Oil-curc mixtures		
298.15	0.939254	0.930824	0.908429
303.15	0.936235	0.928533	0.903304
308.15	0.924798	0.925243	0.902748

Standard uncertainties: $u(\rho) = \pm 2\times10^{-6}$ g/cm^3, $u(T) = \pm 0.01$ K.

Table S6

Oil	ρ	γ	η	Oil	ρ	γ	η
(w/v)%	± 2.10^{-6} g.cm^{-3}	±10^{-2}mN/m	±10^{-4}mPa.s	(w/v)%	±*10^{-3}kg.m^{-3}	±10^{-2}mN/m	±10^{-4}mPa.s
	With SDS				**With Tw-20**		
		298.15 K			**298.15 K**		
0.026	0.988270	56.76	1.0487	0.026	0.988740	47.37	1.0634
0.052	0.988278	53.42	1.0598	0.052	0.988736	45.64	1.0628
0.078	0.988683	54.91	1.0786	0.078	0.988992	45.03	1.0562
0.104	0.988507	54.90	1.0611	0.104	0.988939	46.71	1.0412
0.130	0.988560	54.61	1.0939	0.130	0.988992	45.86	1.0631
		303.15 K			**303.15 K**		
0.026	0.986750	55.58	0.9420	0.026	0.987280	46.30	0.9484
0.052	0.986805	52.09	0.9343	0.052	0.987264	44.24	0.9400
0.078	0.987163	53.80	0.9566	0.078	0.987527	44.25	0.9486
0.104	0.987055	53.81	0.9563	0.104	0.987471	45.67	0.9411
0.130	0.987109	53.83	0.9642	0.130	0.987521	43.86	0.9438
		308.15 K			**308.15 K**		
0.026	0.985033	54.61	1.0909	0.026	0.985579	44.97	0.8456
0.052	0.985106	51.43	1.0499	0.052	0.985561	44.98	0.8427
0.078	0.985455	53.09	1.1242	0.078	0.985819	42.31	0.8481
0.104	0.985328	52.81	1.0550	0.104	0.985771	44.18	0.8156
0.130	0.985383	53.09	1.0511	0.130	0.985819	43.04	0.8442
	With DTAB				**With Tw-40**		
		298.15 K			**298.15 K**		
0.026	0.988868	54.62	0.8561	0.026	0.988621	48.36	1.0740
0.052	0.988486	55.51	0.8527	0.052	0.989524	48.65	1.0326
0.078	0.988447	54.90	0.8544	0.078	0.989035	48.88	1.0638
0.104	0.988477	55.20	0.8505	0.104	0.988825	48.87	1.0600
0.130	0.988644	55.52	0.8364	0.130	0.988625	46.67	1.0478
		303.15 K			**303.15 K**		
0.026	0.987327	53.81	0.9555	0.026	0.987135	47.02	0.8351
0.052	0.987011	54.09	0.9495	0.052	0.988064	46.83	0.8240
0.078	0.986988	54.11	0.9506	0.078	0.987567	47.04	0.8416
0.104	0.986994	53.79	0.9375	0.104	0.987359	47.03	0.8305
0.130	0.987197	53.81	0.9390	0.130	0.987163	46.55	0.8415
		308.15 K			**308.15 K**		
0.026	0.985574	53.10	1.0823	0.026	0.985426	45.63	0.9416
0.052	0.985303	53.37	1.0661	0.052	0.986364	46.12	0.9304
0.078	0.985261	53.08	1.0724	0.078	0.985860	46.10	0.9546
0.104	0.985335	53.09	1.0637	0.104	0.985649	46.55	0.9673
0.130	0.985493	53.38	1.0311	0.130	0.985451	46.08	0.9262

ρ = density, γ = surface tension, η = viscosity, SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.Standard uncertainties, u are: $u(T)$ = ± 0.01 K, $u(\rho)$ = ±2×10^{-6}g/cm^3, $u(\gamma)$= ± 1× 10^{-2}mN/m, $u(\eta)$ = ± 1× 10^{-4} mPa-s.

Table S7

Oil-curc	ρ	γ	η	Oil-curc	ρ	γ	η
(w/v)%	± 2.10^{-6} g.cm^{-3}	±10^{-2}mN/m	±10^{-4}mPa.s	(w/v)%	±2.10^{-6}g.cm^{-3}	±10^{-2}mN/m	±10^{-4}mPa.s
		With SDS				**With Tw-20**	
		298.15 K				**298.15 K**	
0.027	0.988666	56.14	1.0832	0.027	0.988898	47.38	1.0636
0.054	0.988759	54.61	1.0802	0.054	0.988596	45.63	1.0626
0.081	0.989141	53.75	1.0635	0.081	0.989002	45.03	1.0562
0.108	0.988359	53.71	1.0725	0.108	0.988773	46.71	1.0410
0.135	0.988581	53.16	1.0560	0.135	0.988725	45.85	1.0629
		303.15 K				**303.15 K**	
0.027	0.987200	54.69	0.9475	0.027	0.987427	46.31	0.9486
0.054	0.987296	53.81	0.9545	0.054	0.987121	44.24	0.9399
0.081	0.987574	52.68	0.9468	0.081	0.987538	44.26	0.9485
0.108	0.986888	52.66	0.9486	0.108	0.987307	45.67	0.9409
0.135	0.987113	52.41	0.9520	0.135	0.987257	43.85	0.9436
		308.15 K				**308.15 K**	
0.027	0.985503	53.45	1.0583	0.027	0.985721	44.98	0.8457
0.054	0.985605	53.10	1.0752	0.054	0.985407	44.96	0.8425
0.081	0.985879	52.28	1.0451	0.081	0.985835	42.31	0.8481
0.108	0.985177	51.98	1.0582	0.108	0.985598	44.17	0.8155
0.135	0.985416	51.72	1.0672	0.135	0.985546	43.03	0.8440
		With DTAB				**With Tw-40**	
		298.15 K				**298.15 K**	
0.027	0.988610	55.21	0.8496	0.027	0.988743	48.87	1.0599
0.054	0.988683	54.91	0.8627	0.054	0.988933	48.37	1.0688
0.081	0.988408	55.20	0.8573	0.081	0.988709	48.36	1.0595
0.108	0.988816	54.92	0.8495	0.108	0.989482	43.88	1.0777
0.135	0.988903	55.85	0.8574	0.135	0.988780	48.37	1.0666
		303.15 K				**303.15 K**	
0.027	0.987145	53.80	0.9577	0.027	0.987272	46.42	0.8245
0.054	0.987202	53.81	0.9457	0.054	0.987462	48.66	0.8563
0.081	0.986935	53.79	0.9537	0.081	0.987242	47.16	0.8437
0.108	0.987337	54.40	0.9438	0.108	0.988042	47.97	0.8471
0.135	0.987426	54.41	0.9604	0.135	0.987307	46.50	0.8406
		308.15 K				**308.15 K**	
0.027	0.985436	53.38	1.0704	0.027	0.985567	45.64	0.9474
0.054	0.985488	53.38	1.0739	0.054	0.985750	46.32	0.9595
0.081	0.985229	52.80	1.0622	0.081	0.985530	46.31	0.9757
0.108	0.985636	53.39	1.0625	0.108	0.986349	41.09	0.9874
0.135	0.985717	53.97	1.0671	0.135	0.985603	46.09	0.9661

ρ = density, γ = surface tension, η = viscosity, SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.Standard uncertainties, u are: u(T) = ± 0.01 K, u(ρ) = ±2×10^{-6}g/cm^3, u(γ)= ± 1× 10^{-2}mN/m, u(η) = ± 1× 10^{-4} mPa-s.

Table S8

Oil (w/v)%	ρ ± ±2.10^{-6}g.cm^{-3}	γ ±10^{-2}mN/m	η ±10^{-4}mPa.s	Oil (w/v)%	ρ ±10^{-3}kg m^{-3}	γ ±10^{-2}mN/m	η ±10^{-4}mPa.s
	(w/v)%				With Tw-20		
	298.15 K				298.15 K		
0.026	0.988246	52.03	1.0851	0.026	0.988729	46.49	1.0904
0.052	0.988123	53.70	1.0790	0.052	0.988676	45.84	1.0860
0.078	0.988449	53.15	1.0880	0.078	0.988113	43.81	1.0962
0.104	0.988300	50.46	1.0909	0.104	0.988421	41.12	1.1044
0.130	0.988256	55.50	1.1381	0.130	0.988819	45.02	1.0963
	303.15 K				303.15 K		
0.026	0.986787	50.51	0.9665	0.026	0.987269	45.66	0.9703
0.052	0.986644	52.36	0.9610	0.052	0.987205	45.25	1.0183
0.078	0.986980	50.52	0.9557	0.078	0.986638	42.51	0.9835
0.104	0.986840	52.37	0.9748	0.104	0.986952	42.53	0.9703
0.130	0.986806	54.37	0.9993	0.130	0.987351	43.29	0.9751
	308.15 K				308.15 K		
0.026	0.985067	50.91	0.8492	0.026	0.985581	43.98	0.8635
0.052	0.984939	52.24	0.8535	0.052	0.985489	43.40	0.8600
0.078	0.985259	51.44	0.8630	0.078	0.984913	41.22	0.8724
0.104	0.985131	51.44	0.8726	0.104	0.985247	44.16	0.7600
0.130	0.985123	53.94	0.8727	0.130	0.985652	42.48	0.8696
	With DTAB				With Tw-40		
	298.15 K				298.15 K		
0.026	0.988655	55.52	1.0761	0.026	0.988472	50.72	1.1016
0.052	0.988405	54.30	1.0931	0.052	0.988579	51.25	1.0861
0.078	0.988251	54.00	1.0905	0.078	0.988545	52.80	1.1221
0.104	0.988324	52.58	1.0939	0.104	0.988343	51.62	1.0970
0.130	0.988634	53.16	1.0828	0.130	0.988126	53.26	1.1318
	303.15 K				303.15 K		
0.026	0.987326	54.10	0.9573	0.026	0.986990	49.02	1.0180
0.052	0.986938	52.38	0.9596	0.052	0.987107	49.77	0.9590
0.078	0.986775	52.92	0.9677	0.078	0.987043	43.65	0.9864
0.104	0.986872	51.56	0.9724	0.104	0.986873	46.50	0.9887
0.130	0.987170	52.11	0.9655	0.130	0.986654	43.83	0.9814
	308.15 K				308.15 K		
0.026	0.985654	53.11	0.8613	0.026	0.985278	47.75	0.8996
0.052	0.985223	53.37	0.8606	0.052	0.985404	48.45	0.9160
0.078	0.985069	52.24	0.8609	0.078	0.985337	41.94	0.8708
0.104	0.985188	50.91	0.8560	0.104	0.985165	45.36	0.8786
0.130	0.985460	51.19	0.8958	0.130	0.984947	43.00	0.8634

ρ= density, γ = surface tension, η= viscosity, SDS= sodium dodecyl sulphate, DTAB= dodecyltrimethylammonium bromide, Tw-20= tween-20, Tw-40 = tween-40. Standard uncertainties, u are: $u(T)$ = ± 0.01 K, $u(\rho)$ = ±2×10^{-6}g/cm^3, $u(\gamma)$= ± 1× 10^{-2}mN/m, $u(\eta)$ = ± 1× 10^{-4} mPa-s.

Table S9

Oil-curc (w/v)%	ρ $\pm 2.10^{-6}$g.cm^{-3}	γ $\pm 10^{-2}$mN/m	η $\pm 10^{-4}$mPa.s	Oil-curc (w/v)%	ρ $\pm 2.10^{-6}$ g.cm^{-3}	γ $\pm 10^{-2}$mN/m	η $\pm 10^{-4}$mPa.s
	With SDS				**With Tw-20**		
	298.15 K				**298.15 K**		
0.027	0.988262	55.81	1.0771	0.027	0.988703	45.02	0.9199
0.054	0.988197	57.08	1.0819	0.054	0.988889	46.28	1.0911
0.081	0.988154	56.43	1.0636	0.081	0.988347	46.04	0.9296
0.108	0.988390	54.90	1.0793	0.108	0.988832	46.06	1.0793
0.135	0.989916	56.86	1.0378	0.135	0.988887	46.28	1.0791
	303.15 K				**303.15 K**		
0.027	0.986781	55.28	0.9630	0.027	0.987219	43.09	0.9677
0.054	0.986704	55.58	0.9558	0.054	0.987382	44.45	0.9453
0.081	0.988679	54.00	0.9571	0.081	0.986872	44.42	0.9776
0.108	0.986919	53.50	0.9575	0.108	0.987355	44.64	0.9572
0.135	0.988471	57.61	0.9379	0.135	0.987402	44.85	0.9609
	308.15 K				**308.15 K**		
0.027	0.985083	54.23	0.8538	0.027	0.985516	42.48	0.8622
0.054	0.984981	54.53	0.8535	0.054	0.985661	43.60	0.9265
0.081	0.984975	56.37	0.8554	0.081	0.985161	43.20	0.8679
0.108	0.985214	53.94	0.8531	0.108	0.985651	43.61	0.7794
0.135	0.986795	55.53	0.8214	0.135	0.985701	43.22	0.8536
	With DTAB				**With Tw-40**		
	298.15 K				**298.15 K**		
0.027	0.988182	54.58	1.0948	0.027	0.988499	51.77	1.0961
0.054	0.988037	53.70	0.9674	0.054	0.988561	52.05	1.0673
0.081	0.988023	53.99	1.0820	0.081	0.988845	61.58	1.0931
0.108	0.989783	55.90	1.0750	0.108	0.988534	55.34	1.1343
0.135	0.987991	53.41	1.0857	0.135	0.988437	60.38	1.1043
	303.15 K				**303.15 K**		
0.027	0.986707	53.49	0.9682	0.027	0.987022	50.52	0.9696
0.054	0.986534	53.19	0.9640	0.054	0.987102	50.02	0.9571
0.081	0.986591	52.91	0.9641	0.081	0.987380	50.28	0.9618
0.108	0.988333	54.76	0.9656	0.108	0.987062	49.52	0.9986
0.135	0.986503	52.35	0.9748	0.135	0.986967	49.51	0.9793
	308.15 K				**308.15 K**		
0.027	0.984991	53.07	0.8600	0.027	0.985314	45.57	0.8621
0.054	0.984741	52.50	0.8624	0.054	0.985398	47.53	0.8619
0.081	0.984860	51.96	0.9185	0.081	0.985679	48.94	0.8590
0.108	0.986663	54.32	0.8344	0.108	0.985358	48.22	0.8675
0.135	0.984801	51.68	0.8599	0.135	0.985251	48.45	0.8772

ρ = density, γ = surface tension, η = viscosity, SDS= sodium dodecyl sulphate, DTAB= dodecyltrimethylammonium bromide, Tw-20= tween-20, Tw-40 = tween-40. Standard uncertainties, u are: $u(T)$ = ± 0.01 K, $u(\rho)$ = $\pm 2\times 10^{-6}$g/cm^3, $u(\gamma)$= ± 1× 10^{-2}mN/m, $u(\eta)$ = ± 1× 10^{-4} mPa-s.

Table S10

Oil (w/v)%	ρ $\pm 2.10^{-6}$g.cm^{-3}	γ $\pm 10^{-2}$mN/m	η $\pm 10^{-4}$mPa.s	Oil (w/v)%	ρ $\pm 2.10^{-6}$g.cm^{-3}	γ $\pm 10^{-2}$mN/m	η $\pm 10^{-4}$mPa.s
	With SDS				**With Tw-20**		
		298.15 K			**298.15 K**		
0.026	0.988263	56.44	1.0738	0.026	0.988508	47.13	1.3760
0.052	0.988270	56.12	1.0675	0.052	0.988677	46.48	1.3745
0.078	0.988384	57.09	1.0715	0.078	0.988079	46.03	1.3735
0.104	0.988368	50.97	1.0669	0.104	0.988116	46.24	1.3892
0.130	0.988529	52.32	1.0668	0.130	0.988040	46.67	1.3934
		303.15 K			**303.15 K**		
0.026	0.986803	55.28	0.9556	0.026	0.987038	45.86	1.1949
0.052	0.986791	54.67	0.9553	0.052	0.987188	44.84	1.2112
0.078	0.986957	55.91	0.9502	0.078	0.986588	45.42	1.2019
0.104	0.986915	48.78	0.9495	0.104	0.986639	45.02	1.2113
0.130	0.987050	49.52	0.9515	0.130	0.986531	44.41	1.2065
		308.15 K			**308.15 K**		
0.026	0.985127	54.53	0.8480	0.026	0.985322	44.56	1.0314
0.052	0.985082	55.74	0.8489	0.052	0.985472	43.59	1.0382
0.078	0.985225	55.14	0.8451	0.078	0.984880	43.95	1.0428
0.104	0.985209	47.75	0.8475	0.104	0.984918	43.76	1.0461
0.130	0.984426	49.61	0.8468	0.130	0.984786	43.37	1.0349
	With DTAB				**With Tw-40**		
		298.15 K			**298.15 K**		
0.026	0.988315	53.42	0.8800	0.026	0.987874	51.21	1.1043
0.052	0.988272	54.00	0.9201	0.052	0.988447	51.50	1.0967
0.078	0.987892	51.74	0.8842	0.078	0.988298	51.23	1.0962
0.104	0.986684	53.91	0.8610	0.104	0.988487	51.51	1.0895
0.130	0.988060	53.41	0.8780	0.130	0.988491	51.52	1.0906
		303.15 K			**303.15 K**		
0.026	0.986830	52.37	0.9727	0.026	0.986381	49.98	0.8584
0.052	0.986798	52.65	0.9516	0.052	0.986957	50.01	0.8472
0.078	0.986434	50.75	1.0132	0.078	0.986819	50.00	0.8545
0.104	0.985041	52.28	0.9537	0.104	0.986968	50.52	0.8573
0.130	0.986424	52.07	0.9742	0.130	0.987022	49.76	0.8497
		308.15 K			**308.15 K**		
0.026	0.985109	51.17	1.0813	0.026	0.984662	48.65	0.9813
0.052	0.985102	51.97	1.0713	0.052	0.985229	48.92	0.9750
0.078	0.984751	50.63	1.0854	0.078	0.985086	48.91	0.9776
0.104	0.988287	51.87	1.0587	0.104	0.985200	48.92	0.9663
0.130	0.984395	51.13	1.1347	0.130	0.985310	48.92	0.9677

ρ = density, γ = surface tension, η = viscosity, SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.Standard uncertainties, u are: $u(T)$ = ± 0.01 K, $u(\rho)$ = $\pm 2\times10^{-6}$g/cm^3, $u(\gamma)$= ± 1× 10^{-2}mN/m, $u(\eta)$ = ± 1× 10^{-4} mPa-s.

Table S11

Oil-curc (w/v)%	ρ ± 2.10^{-6}g.cm^{-3}	γ ±10^{-2}mN/m	η ±10^{-4}mPa.s	Oil-curc (w/v)%	ρ ±2.10^{-6}g.cm^{-3}	γ ±10^{-2}mN/m	η ±10^{-4}mPa.s
With SDS				**With Tw-20**			
298.15 K				**298.15 K**			
0.026	0.988208	56.76	1.0824	0.026	0.988770	46.92	1.3818
0.052	0.988200	56.12	1.0839	0.052	0.988691	47.14	1.3658
0.078	0.988252	57.08	1.0859	0.078	0.988510	47.13	1.3631
0.104	0.988271	56.76	1.0740	0.104	0.988811	47.15	1.3549
0.130	0.985094	56.58	1.0752	0.130	0.988600	46.48	1.3701
303.15 K				**303.15 K**			
0.026	0.986715	55.27	0.9568	0.026	0.987165	45.45	1.1977
0.052	0.986720	55.58	0.9545	0.052	0.987206	45.66	1.1984
0.078	0.986736	55.90	0.9506	0.078	0.987024	45.44	1.1919
0.104	0.986798	55.59	0.9372	0.104	0.987337	45.67	1.1987
0.130	0.983217	55.70	0.9507	0.130	0.987089	45.87	1.1711
308.15 K				**308.15 K**			
0.026	0.984257	54.78	0.8502	0.026	0.985564	44.37	1.0353
0.052	0.984294	55.08	0.8557	0.052	0.985501	44.17	1.0280
0.078	0.984824	55.11	0.8488	0.078	0.985185	44.35	1.0365
0.104	0.985014	55.12	0.8477	0.104	0.985632	44.18	1.0364
0.130	0.977986	55.03	0.8436	0.130	0.985383	44.76	1.0354
With DTAB				**With Tw-40**			
298.15 K				**298.15 K**			
0.026	0.988243	54.29	0.9110	0.026	0.988520	50.98	1.0846
0.052	0.988101	55.18	0.8731	0.052	0.988514	51.24	1.0820
0.078	0.988617	54.31	0.8679	0.078	0.988091	50.96	1.0794
0.104	0.988140	53.99	0.8806	0.104	0.988624	51.25	1.0777
0.130	0.988671	54.32	0.8739	0.130	0.988586	51.26	1.0802
303.15 K				**303.15 K**			
0.026	0.986743	53.49	0.9578	0.026	0.987034	50.51	0.8560
0.052	0.986615	53.77	0.9566	0.052	0.987027	49.51	0.8567
0.078	0.987136	53.23	0.9714	0.078	0.987007	50.01	0.8457
0.104	0.986650	52.92	0.9753	0.104	0.987152	50.02	0.8473
0.130	0.987183	52.95	0.9584	0.130	0.987102	49.77	0.8384
308.15 K				**308.15 K**			
0.026	0.984975	52.79	1.0792	0.026	0.985266	48.92	0.9672
0.052	0.984805	53.34	1.0780	0.052	0.985247	48.44	0.9744
0.078	0.984508	52.26	1.0803	0.078	0.985304	48.45	0.9711
0.104	0.984907	52.23	1.0836	0.104	0.985442	48.93	0.9715
0.130	0.979349	51.94	1.0689	0.130	0.984958	48.67	0.9755

ρ= density, γ = surface tension, η = viscosity, SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.Standard uncertainties, u are: $u(T)$ = ± 0.01 K, $u(\rho)$ = ±2×10^{-6}g/cm^3, $u(\gamma)$= ± 1× 10^{-2}mN/m, $u(\eta)$ = ± 1× 10^{-4} mPa-s.

Table S12

Oil (w/v)%	SDS	DTAB	Tw-20	Tw-40
		Peanut oil		
		298.15 K		
0.026	0.01848	0.01567	0.02245	0.02221
0.052	0.01984	0.01536	0.02329	0.02122
0.078	0.01964	0.01556	0.02576	0.02176
0.104	0.01933	0.01541	0.02693	0.02169
0.130	0.02003	0.01506	0.02318	0.02245
		303.15 K		
0.026	0.01695	0.01776	0.02048	0.01776
0.052	0.01793	0.01755	0.02125	0.01760
0.078	0.01778	0.01757	0.02143	0.01789
0.104	0.01778	0.01743	0.02060	0.01766
0.130	0.01792	0.01745	0.02367	0.01987
		308.15 K		
0.026	0.01582	0.02038	0.01880	0.02063
0.052	0.01632	0.01998	0.01975	0.02017
0.078	0.01692	0.02020	0.02004	0.02071
0.104	0.01597	0.02004	0.01846	0.02078
0.130	0.01582	0.01932	0.01961	0.02010
		Linseed oil		
		298.15 K		
0.026	0.02085	0.01938	0.02346	0.02172
0.052	0.02009	0.02013	0.02369	0.02119
0.078	0.02047	0.02020	0.02502	0.02527
0.104	0.02162	0.02080	0.02686	0.02295
0.130	0.02051	0.02037	0.02435	0.02504
		303.15 K		
0.026	0.01913	0.01769	0.02125	0.02077
0.052	0.01835	0.01832	0.02251	0.01927
0.078	0.01834	0.01829	0.02313	0.02260
0.104	0.01861	0.01886	0.02282	0.02126
0.130	0.01838	0.01853	0.02253	0.02239
		308.15 K		
0.026	0.01668	0.01622	0.01964	0.01884
0.052	0.01634	0.01613	0.01981	0.01891
0.078	0.01678	0.01648	0.02116	0.02076
0.104	0.01697	0.01681	0.01972	0.01937
0.130	0.01618	0.01750	0.02047	0.02008
		Mustard oil		
		298.15 K		
0.026	0.01903	0.01647	0.02919	0.02156
0.052	0.01902	0.01703	0.02957	0.02129
0.078	0.01877	0.01709	0.02984	0.02139
0.104	0.02093	0.01597	0.03004	0.02115
0.130	0.02039	0.01644	0.02986	0.02117

		303.15 K		
0.026	0.01729	0.01857	0.02605	0.01718
0.052	0.01748	0.01808	0.02701	0.01694
0.078	0.01700	0.01997	0.02646	0.01709
0.104	0.01947	0.01824	0.02691	0.01697
0.130	0.01922	0.01871	0.02717	0.01708
		308.15 K		
0.026	0.01555	0.02113	0.02315	0.02017
0.052	0.01523	0.02061	0.02382	0.01993
0.078	0.01533	0.02144	0.02373	0.01999
0.104	0.01775	0.02041	0.02391	0.01975
0.130	0.01707	0.02220	0.02387	0.01978

Standard uncertainties are: $u(\sigma)$ = ± 0.00002 (s·m^{-1}),$u(T)$ = ± 0.01 K.SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.

Table S13

Oil-curc (w/v)%	SDS	DTAB	Tw-20	Tw-40
		Peanut oil		
		298.15 K		
0.027	0.02362	0.01539	0.02301	0.02169
0.054	0.02345	0.01571	0.02415	0.02209
0.081	0.02318	0.01553	0.02642	0.02191
0.108	0.02287	0.01547	0.02667	0.02456
0.135	0.02325	0.01535	0.02338	0.02205
		303.15 K		
0.027	0.02151	0.01780	0.02047	0.01780
0.054	0.02157	0.01758	0.02212	0.01830
0.081	0.02101	0.01773	0.02201	0.01803
0.108	0.02088	0.01735	0.02059	0.02000
0.135	0.02162	0.01765	0.02481	0.01994
		308.15 K		
0.027	0.01974	0.02005	0.01905	0.02076
0.054	0.01989	0.02012	0.02010	0.02071
0.081	0.01924	0.02012	0.02030	0.02107
0.108	0.01983	0.01990	0.01862	0.02403
0.135	0.01999	0.01977	0.01985	0.02096
		Linseed oil		
		298.15 K		
0.027	0.01930	0.02006	0.02043	0.02117
0.054	0.01895	0.01802	0.02358	0.02051
0.081	0.01885	0.02004	0.02019	0.02111
0.108	0.01966	0.01923	0.02343	0.02214
0.135	0.01825	0.02033	0.02332	0.02155
		303.15 K		
0.027	0.01742	0.01810	0.02246	0.01919
0.054	0.01720	0.01812	0.02127	0.01914
0.081	0.01719	0.01822	0.02201	0.01913
0.108	0.01790	0.01764	0.02144	0.02017

0.135	0.01628	0.01862	0.02143	0.01978
		308.15 K		
0.027	0.01574	0.01620	0.02030	0.01892
0.054	0.01566	0.01643	0.02125	0.01814
0.081	0.01518	0.01768	0.02009	0.01755
0.108	0.01582	0.01536	0.02048	0.01799
0.135	0.01479	0.01664	0.01975	0.01811
		Mustard oil		
		298.15 K		
0.026	0.01907	0.01678	0.02945	0.02127
0.052	0.01931	0.01582	0.02897	0.02111
0.078	0.01902	0.01598	0.02891	0.02118
0.104	0.01892	0.01631	0.02874	0.02103
0.130	0.01900	0.01609	0.02948	0.02108
		303.15 K		
0.026	0.01731	0.01791	0.02635	0.01712
0.052	0.01717	0.01779	0.02625	0.01730
0.078	0.01701	0.01825	0.02622	0.01691
0.104	0.01686	0.01843	0.02625	0.01694
0.130	0.01707	0.01810	0.02553	0.01685
		308.15 K		
0.026	0.01552	0.02044	0.02333	0.01977
0.052	0.01553	0.02020	0.02327	0.02011
0.078	0.01540	0.02067	0.02337	0.02004
0.104	0.01538	0.02075	0.02346	0.01986
0.130	0.01533	0.02058	0.02313	0.02004

Standard uncertainties are: $u(\sigma)$ = ± 0.00002 ($s \cdot m^{-1}$), $u(T)$ = ± 0.01 K.SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.

Table S14

T(K)	298.15	303.15	308.15	298.15	303.15	308.15	298.15	303.15	308.15
Peanut oil									
Property	ρ^0(g/cm^3)			γ^o (mN/m)			η^o(mPa.s)		
SDS	0.987971	0.986452	0.984728	58.06	57.01	56.91	1.0444	0.9350	1.0619
DTAB	0.989317	0.987720	0.985919	54.59	53.60	53.29	0.8490	0.9604	1.0706
Tw-20	0.988570	0.987112	0.985416	48.72	46.85	46.41	1.0823	0.9500	0.8608
Tw-40	0.988170	0.986672	0.984960	46.62	46.71	44.97	1.0748	0.8365	0.9065
Linseed oil									
SDS	0.988057	0.986612	0.984909	54.16	51.70	51.98	1.1110	0.9899	0.8383
DTAB	0.989164	0.987946	0.986285	57.09	55.38	53.96	1.0578	0.9448	0.8855
Tw-20	0.989461	0.988013	0.986358	50.97	48.64	45.18	1.0809	0.9626	0.9221
Tw-40	0.988283	0.986816	0.985100	50.04	51.72	50.99	1.1060	1.0389	0.9136
Mustard oil									
SDS	0.988263	0.986761	0.984579	56.72	55.22	55.16	1.0756	0.9611	0.8500
DTAB	0.989479	0.987977	0.983060	54.47	53.55	51.16	1.1237	0.9527	0.8868
Tw-20	0.988806	0.987333	0.985596	48.28	45.85	44.81	1.3804	1.1865	1.0156
Tw-40	0.987537	0.986063	0.984389	51.19	49.51	48.45	1.1114	0.9852	0.8570

Standard uncertainties, u are: u(T) = ± 0.01 K, u(ρ) = ±2×10^{-6}g/cm^3, u(γ)=±1× 10^{-2}mN/m, u(η)= ±1× 10^{-4} mPa-s.SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.

Table S15

T(K)	298.15	303.15	308.15	298.15	303.15	308.15	298.15	303.15	308.15
Peanut oil									
Property	ρ^0(g/cm^3)			γ^o (mN/m)			η^o (mPa.s)		
SDS	0.988419	0.987036	0.985346	57.73	56.14	54.23	1.0809	0.9377	1.0775
DTAB	0.988824	0.987366	0.985650	55.71	53.81	54.18	0.8483	0.9708	1.0797
Tw-20	0.988786	0.987308	0.985599	48.73	46.86	46.43	1.0826	0.9502	0.8609
Tw-40	0.988349	0.986855	0.985149	51.96	44.94	48.10	1.0535	0.8051	0.9120
Linseed oil									
SDS	0.989264	0.986194	0.986118	56.49	58.77	53.47	1.0536	0.9560	0.8334
DTAB	0.987234	0.985702	0.983979	53.57	52.51	52.38	1.1115	0.9770	0.8285
Tw-20	0.989021	0.987525	0.985830	44.33	42.15	41.68	0.9121	0.9621	0.9022
Tw-40	0.988164	0.986679	0.984958	46.95	50.71	43.01	1.0805	0.9643	0.8704
Mustard oil									
SDS	0.986267	0.984550	0.979587	56.39	54.84	54.46	1.0802	0.9698	0.8489
DTAB	0.988262	0.986748	0.981294	54.74	53.72	53.04	0.9414	0.9368	1.0695
Tw-20	0.988851	0.987129	0.985718	46.36	45.58	44.73	1.4059	1.1858	1.0337
Tw-40	0.988840	0.987026	0.984945	51.00	49.86	49.14	1.0902	0.8588	0.9665

Standard uncertainties, *u* are: *u*(*T*) = ± 0.01 K, *u(ρ)* = ±2×10^{-6}g/cm^3, *u(γ)*=±1× 10^{-2}mN/m, *u(η)*= ±1× 10^{-4} mPa-s.SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.

Table S16

Temp. (K)	SDS	DTAB	Tw-20	Tw-40
Peanut oil	**σ* for blank formulations**			
298.15	0.01890	0.01625	0.02856	0.02171
303.15	0.01737	0.01773	0.02588	0.01730
308.15	0.01532	0.02195	0.02265	0.02033
	σ* for CLFs			
298.15	0.01915	0.01728	0.03031	0.02137
303.15	0.01767	0.01743	0.02602	0.01722
308.15	0.01558	0.02016	0.02310	0.01966
Linseed oil	**σ* for blank formulations**			
298.15	0.02049	0.01846	0.02069	0.02013
303.15	0.01963	0.01701	0.01956	0.01997
308.15	0.01613	0.01600	0.01886	0.01772
	σ* for CLFs			
298.15	0.01881	0.02072	0.02055	0.02087
303.15	0.01664	0.01859	0.02281	0.01901
308.15	0.01558	0.01579	0.02002	0.02007
Mustard oil	**σ* for blank formulations**			
298.15	0.01796	0.01555	0.01755	0.02302
303.15	0.01636	0.01791	0.02156	0.01898
308.15	0.01484	0.02009	0.01850	0.02016
	σ* for CLFs			
298.15	0.02420	0.01520	0.01830	0.02000
303.15	0.02235	0.01803	0.02176	0.01757
308.15	0.02024	0.01992	0.01878	0.01866

Standard uncertainties are: $u(\sigma)$ = ± 0.00002 ($s \cdot m^{-1}$), $u(T)$ = ± 0.01 K.SDS = sodium dodecyl sulphate, DTAB = dodecyltrimethylammonium bromide, Tw-20 = tween-20, Tw-40 = tween-40.

TABLE S17

Surfactant Used	Ionic Nature	Important factors considered/optimized	Reference
Short, medium and long chain triacylglycerols	Nonionic	Particle sizes, evaluation of the impact of oil and droplet size on bio accessibility	**[31]**
Soybean oil, hydrogenated l-α-phosphatidylcholine	Nonionic	Particle size, cytotoxicity and drug loading efficacy	**[32]**
OSA-modified starch	Nonionic	Particle size, zeta potential, AFM analysis, TEM study and storage stability	**[33]**
Modified starch, WPI isolate,Tween-20	Nonionic	Particle sizes, *in-vitro* lipolysis	**[34]**
Tween-20, SDS and DTAB	Nonionic, anionic and cationic	Particle sizes, effect of surface charge on the functional performance	**[35]**
MCT-60, Tween-80, Whey Protein Concentrate (WPC-70)	Nonionic	Centrifugation, particle size, zeta potential	**[36]**
Purity Gum 2000, Hi-Cap 100, Purity Gum Ultra	Nonionic (Purity Gum 2000 and Hi-Cap 100) and Purity Gum Ultra	Particle sizes, zeta potential, PDI, CMC, IFT and viscosities	**[37]**
Tween-20, Tween-80	Nonionic	Particle sizes, zeta potential and *in vitro* drug release	**[38]**
Poloxamer-407 and polyvinyl alcohol	Nonionic	Particle size, surface morphology and zeta potential	**[39]**
Tocopheryl Acetate	Nonionic	Particle size, zeta potential and TEM studies	**[40]**
Brij 56 and Span 20 (2012)	Nonionic	Particle size, PDI, hydrophilic-lipophilic balance, curcumin to water and surfactant to water (w/w) proportions	**[41]**
Tween-80 (2013)	Nonionic	Particle size, PDI, impact of Span 80 as co-surfactant, operating pressure and separation between orifice plate and blade of the used hydrodynamic cavitation reactor, encapsulation efficacy of curcumin	**[42]**
SDS, DTAB, Poloxamer-407 and Tw-20	Cationic, anionic and nonionic	Particle size, PDI, surface tension, viscosity, *in vitro* radical scavenging activity, thermodynamically varying sound velocities, electrical conductivity, acoustic impedance and FTIR spectroscopy	**[43-44]**
2016	Nonionic	Surface morphology, particle sizes, pH and physical stability, *in vitro* drug release efficacy	**[45]**

Tween-20	Nonionic	Particle sizes, PDI, surface morphology, *in-vitro* radical scavenging and digestion (small intestine), optimization of oil, curc and surfactant ratios	**[46]**
Our Study	Cationic, Anionic and Nonionic	Particle size, PDI, surface tension, viscosity, friccohesity, pH, *in vitro* radical scavenging activity, FTIR spectroscopy, effect of oils	-----

Table Legends

Table S1 Calibration data: Density, $\rho^{Literature}$, PDN, $n^{Experimental}$, VFT, $t^{Experimental}$, viscosity, $\eta^{Literature}$, surface tension, $\gamma^{Literature}$, calibration constant for viscosity, $K\eta$ and surface tension, $K\gamma$, at T = (298.15, 303.15 and 308.15) K

Table S2 Major fatty acids of linseed, mustard and peanut oils[28,32-33]

Table S3 The DPPH· RSAs of oil-curcumin and ethanol-curcumin mixtures with chosen oils

Table S4 Room temperature (RT) pH of CLFs with, (a) peanut, (b) linseed and (c) mustard oil.

Table S5 Densities, ρ (g.cm^{-3}) of chosen oils and oil-curc mixtures at 298.15, 303.15 and 308.15 K

Table S6 Physicochemical properties (PCPs) of peanut oil blank formulations

Table S7 Physicochemical properties (PCPs) of peanut oil CLFs

Table S8 Physicochemical properties (PCPs) of linseed oil blank formulations

Table S9 Physicochemical properties (PCPs) of linseed oil CLFs

Table S10 Physicochemical properties (PCPs) of mustard oil blank formulations

Table S11 Physicochemical properties (PCPs) of mustard oil CLFs

Table S12 Friccohesities, σ (s.m^{-1}) of blank formulations at 298.15, 303.15 and 308.15 K

Table S13 Friccohesities, σ (s.m^{-1}) of CLFs at 298.15, 303.15 and 308.15 K

Table S14 Limitingdensities,ρ^0 surface tensions, γ^o and viscosities, η^o of blank formulations at 298.15, 303.15 and 308.15 K

Table S15 Limiting densities,ρ^0 surface tensions, γ^o and viscosities, η^o of CLFs at 298.15, 303.15 and 308.15 K

Table S16 Limiting friccohesities, σ* for blank and CLFs at 298.15, 303.15 and 308.15 K

Table S17 An account of stability and surfactant prospects of major attempts for improving curcumin activity *via* encapsulation in nanoemulsions

Figures

Fig. S1

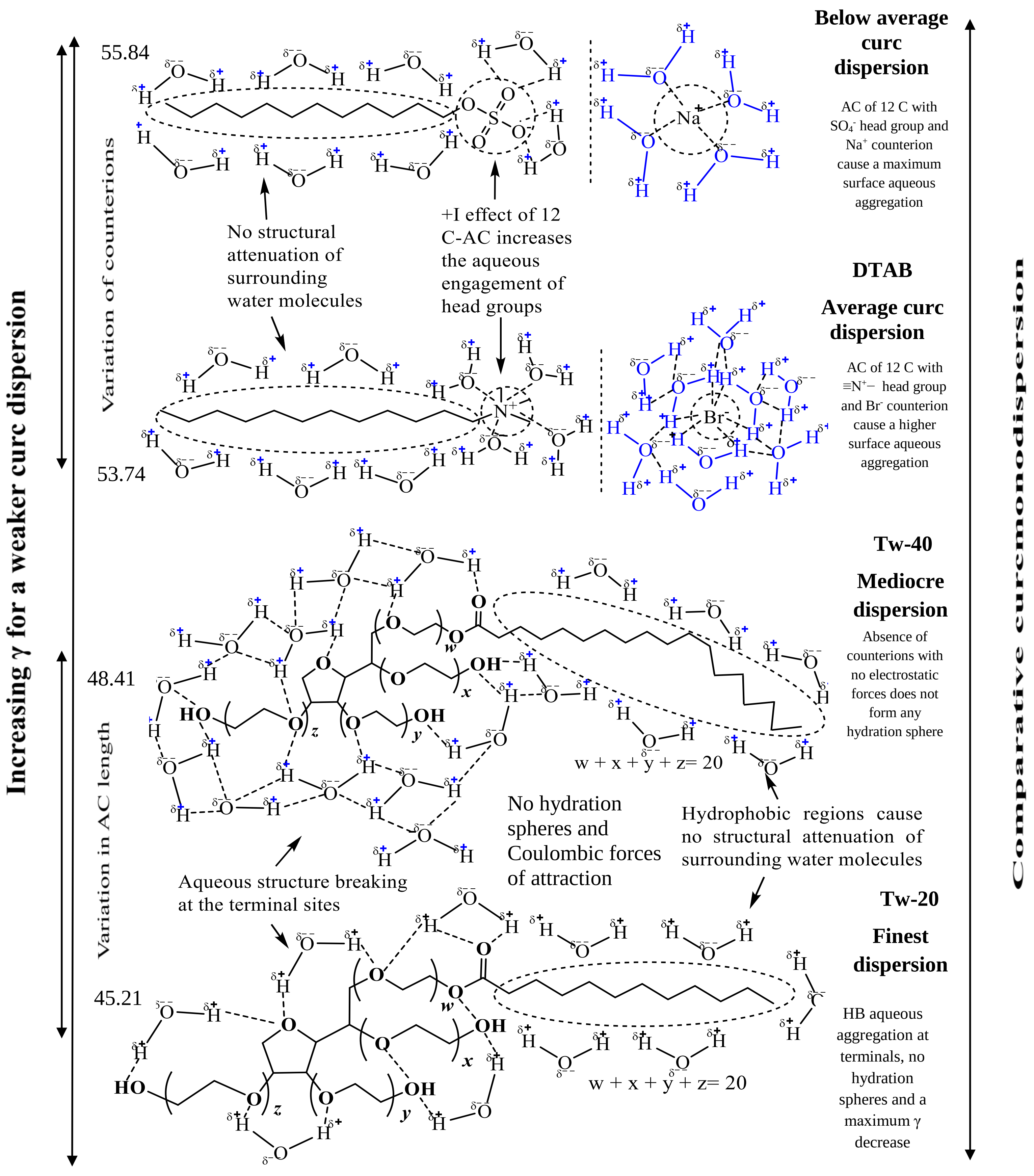
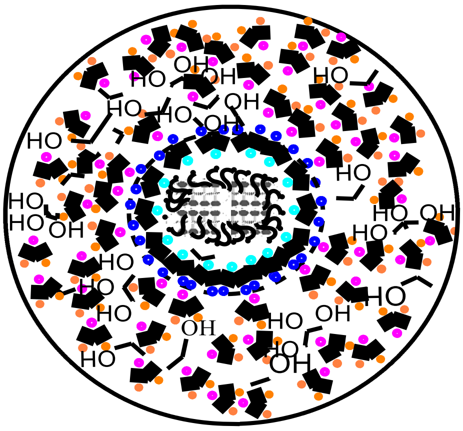
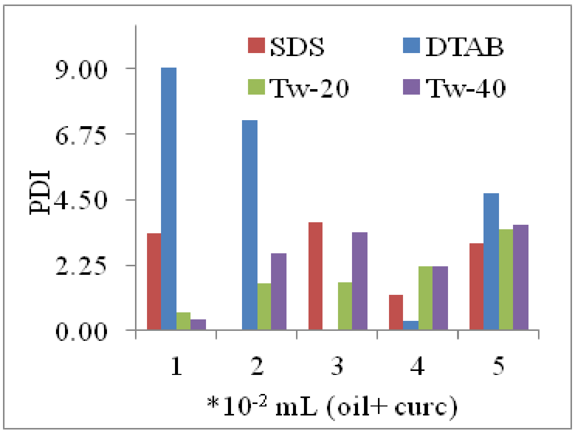


Fig.S2

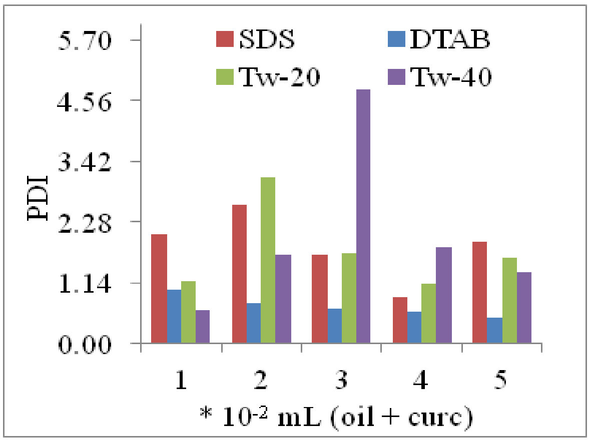


(i)

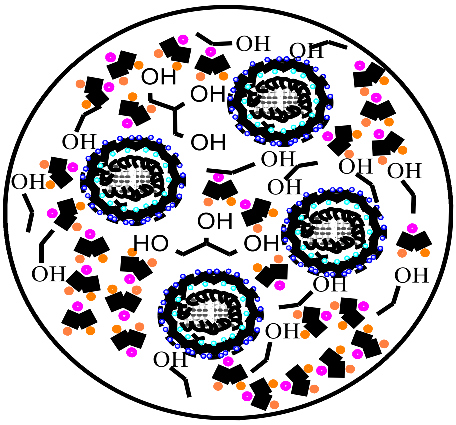
Hydrophillic gradients for modulating curc kinetics *via* self-assembled molecular networking (PDI > 1)



Peanut oil

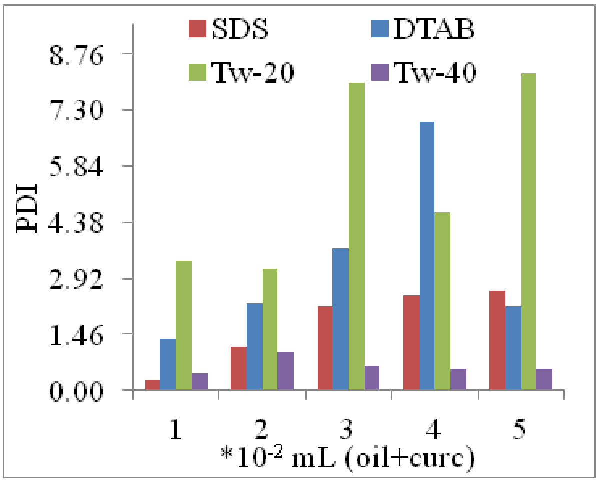


Linseed oil



(ii)

Multiple distribution patterns of curc stabilized *via* functional tentropic gradients (PDI lower and closer to1)



Mustard oil

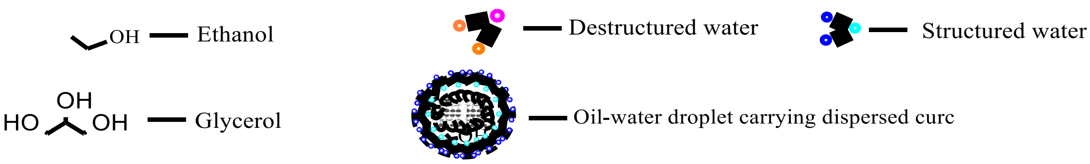
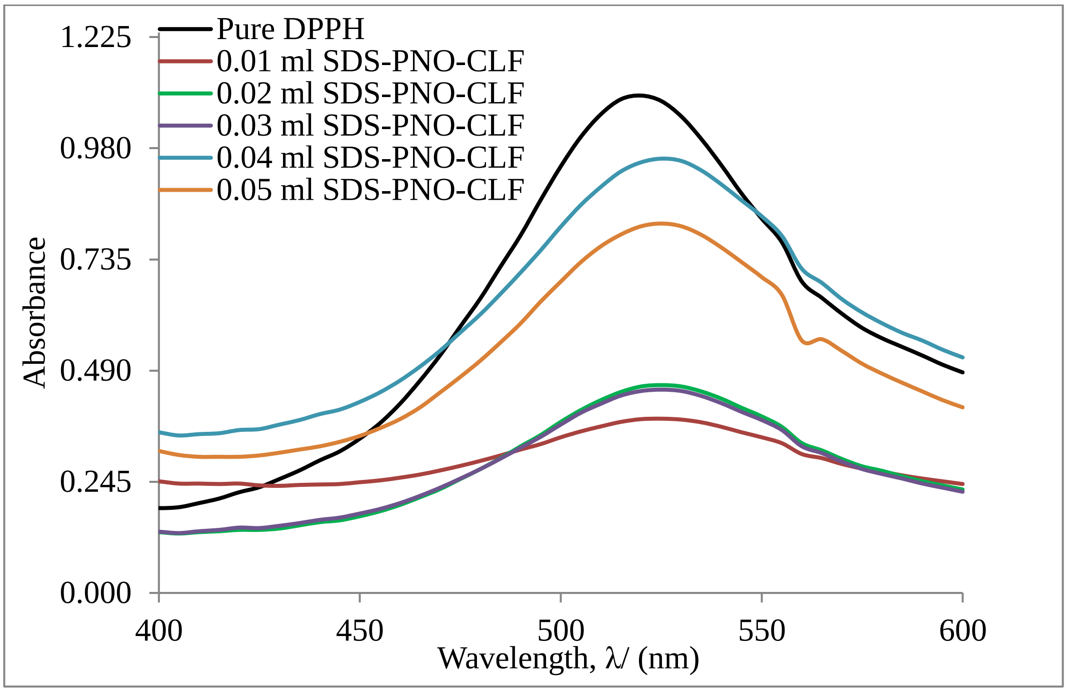
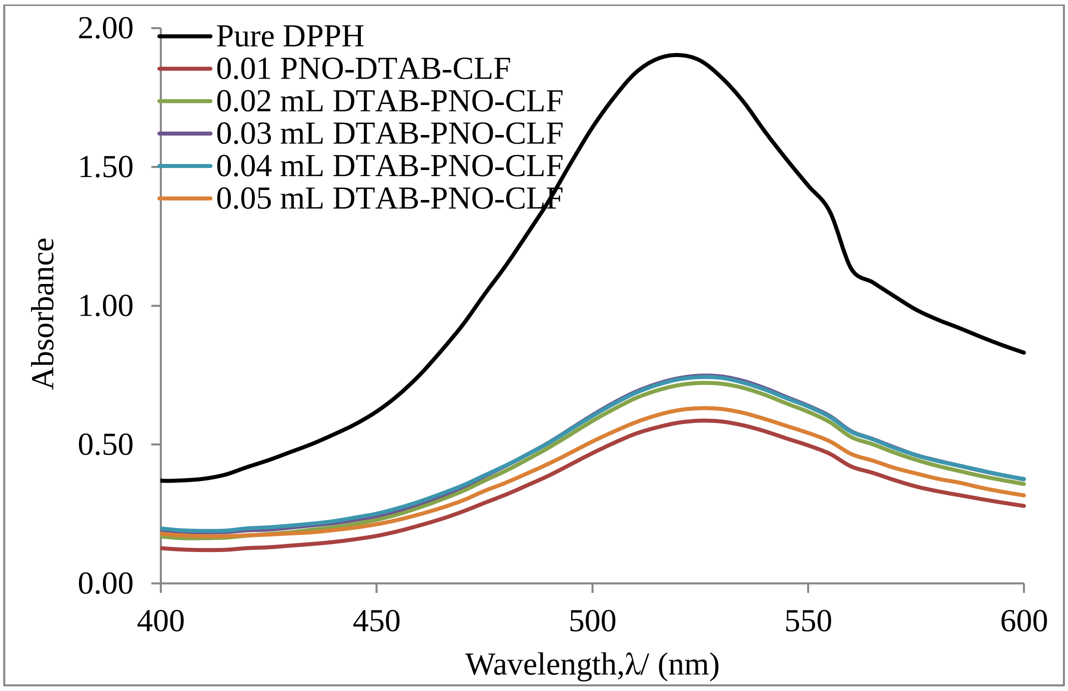


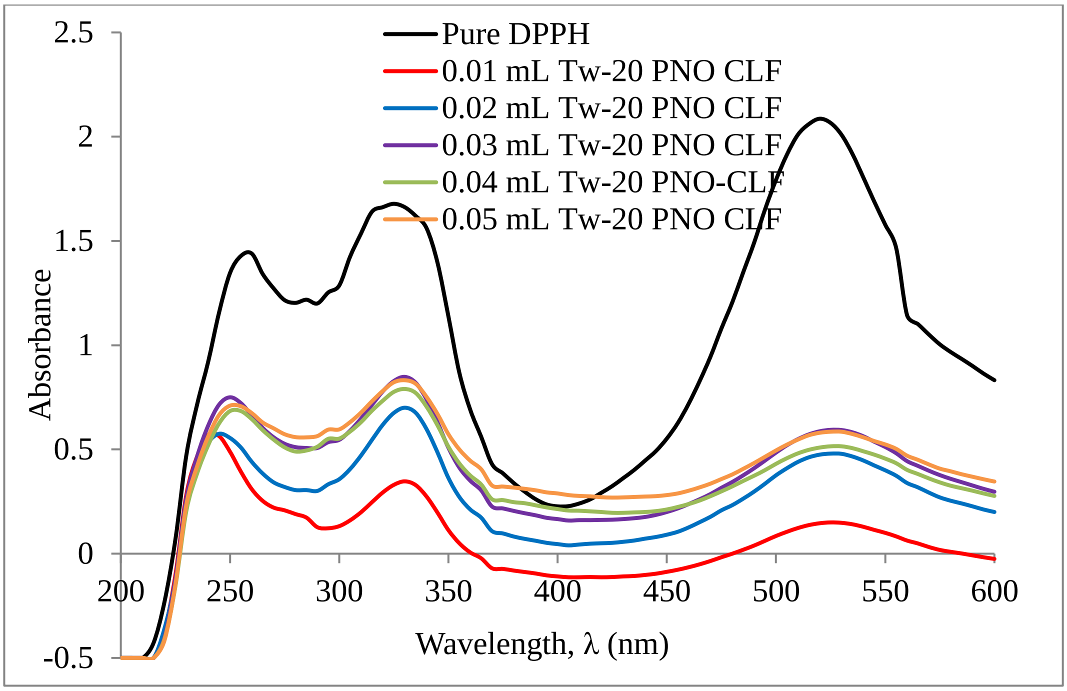
Fig.S3


Pure DPPH
0.01 ml SDS-PNO-CLF
0.02 ml SDS-PNO-CLF
0.03 ml SDS-PNO-CLF
0.04 ml SDS-PNO-CLF
0.05 ml SDS-PNO-CLF
1.225
0.980
0.735
0.490
0.245
0.000
Absorbance
400
450
500
550
600
Wavelength, λ/ (nm)

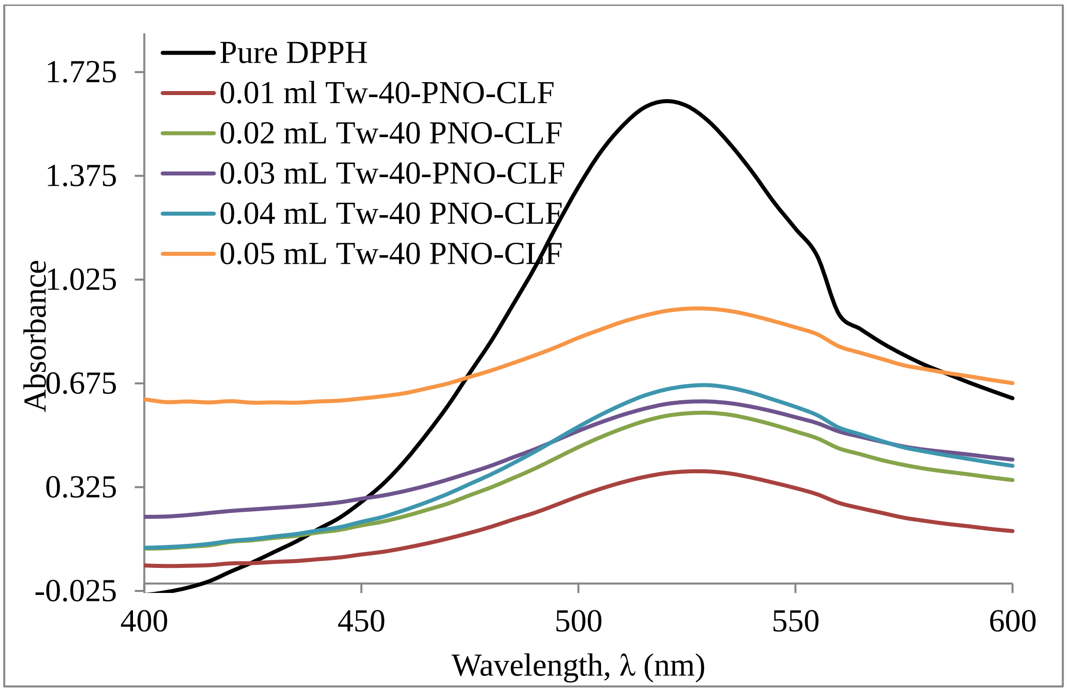
(a)


Pure DPPH
0.01 PNO-DTAB-CLF
0.02 mL DTAB-PNO-CLF
0.03 mL DTAB-PNO-CLF
0.04 mL DTAB-PNO-CLF
0.05 mL DTAB-PNO-CLF
2.00
1.50
1.00
0.50
0.00
Absorbance
400
450
500
550
600
Wavelength,λ/ (nm)

(b)

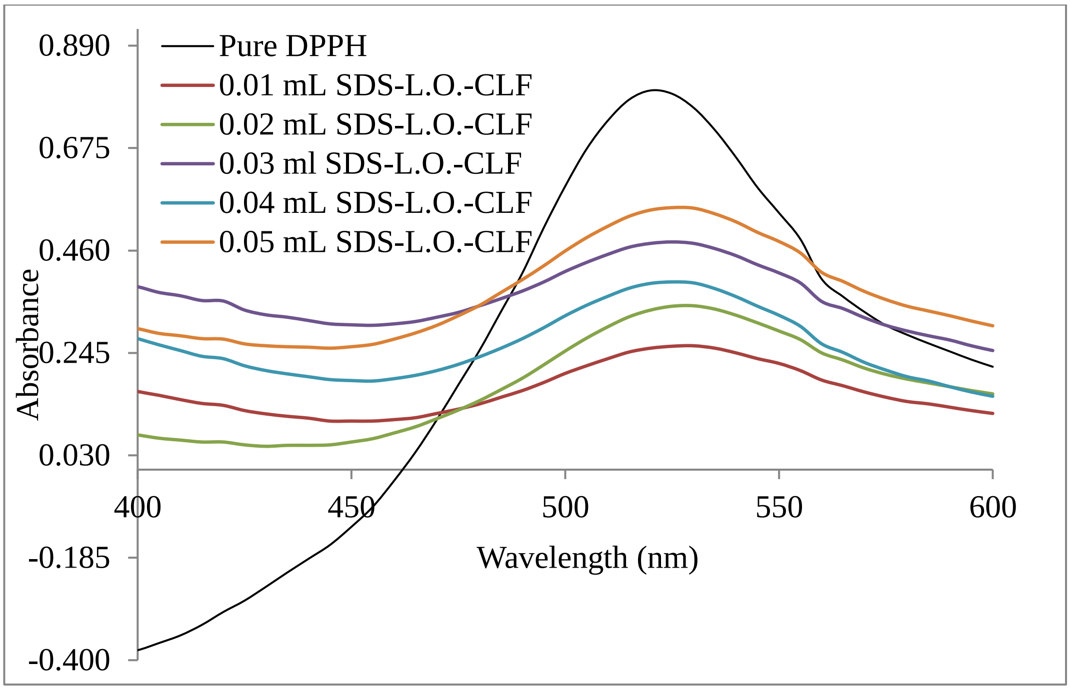

Pure DPPH
0.01 mL Tw-20 PNO CLF
0.02 mL Tw-20 PNO CLF
0.03 mL Tw-20 PNO CLF
0.04 mL Tw-20 PNO-CLF
0.05 mL Tw-20 PNO CLF
Absorbance
Wavelength, λ (nm)
2.5
2
1.5
1
0.5
0
-0.5
200
250
300
350
400
450
500
550
600

(c)


Pure DPPH
0.01 ml Tw-40-PNO-CLF
0.02 mL Tw-40 PNO-CLF
0.03 mL Tw-40-PNO-CLF
0.04 mL Tw-40 PNO-CLF
0.05 mL Tw-40 PNO-CLF
Absorbance
Wavelength, λ (nm)
1.725
1.375
1.025
0.675
0.325
-0.025
400
450
500
550
600

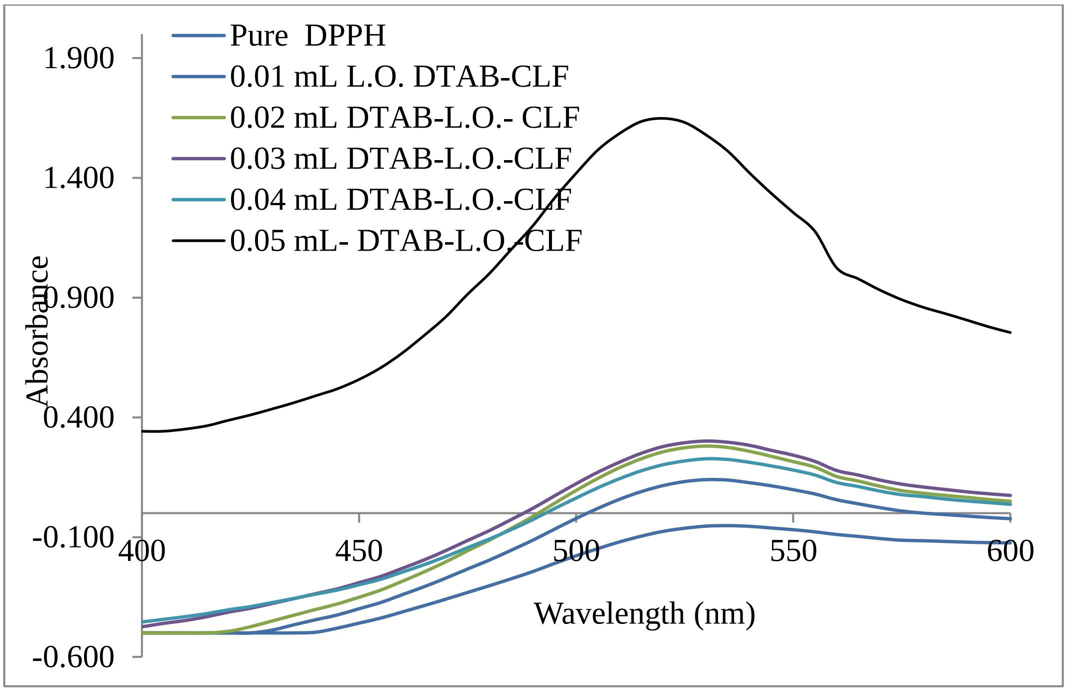
(d)

Fig. S4



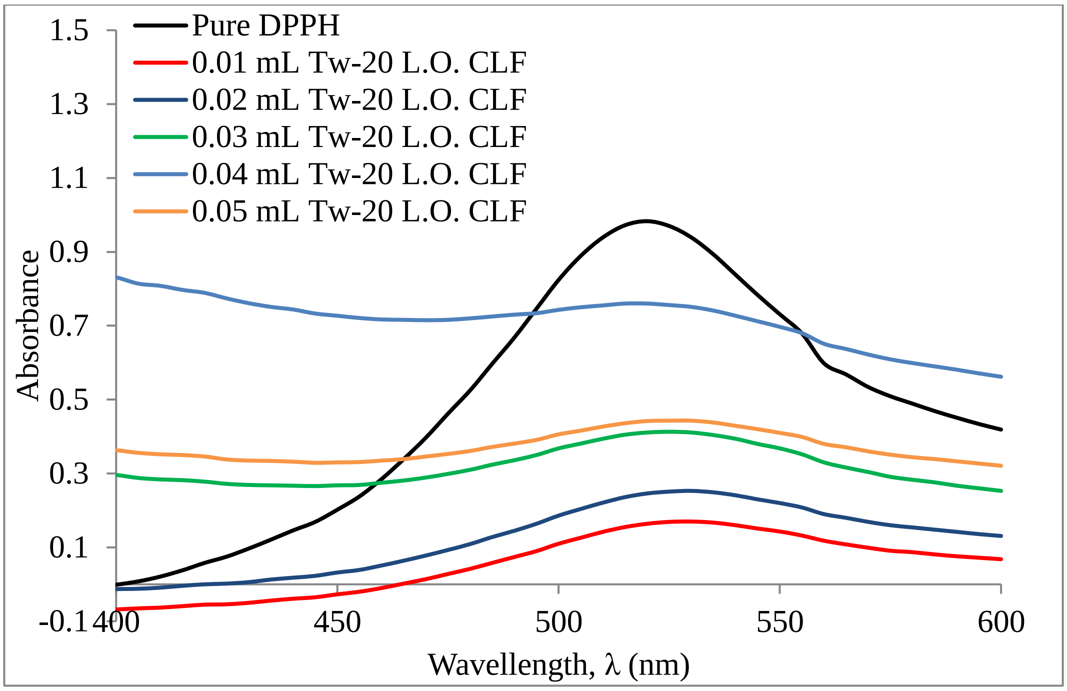
Pure DPPH
0.01 mL SDS-L.O.-CLF
0.02 mL SDS-L.O.-CLF
0.03 ml SDS-L.O.-CLF
0.04 mL SDS-L.O.-CLF
0.05 mL SDS-L.O.-CLF
0.890
0.675
0.460
0.245
0.030
-0.185
-0.400
Absorbance
400
450
500
550
600
Wavelength (nm)

(a)

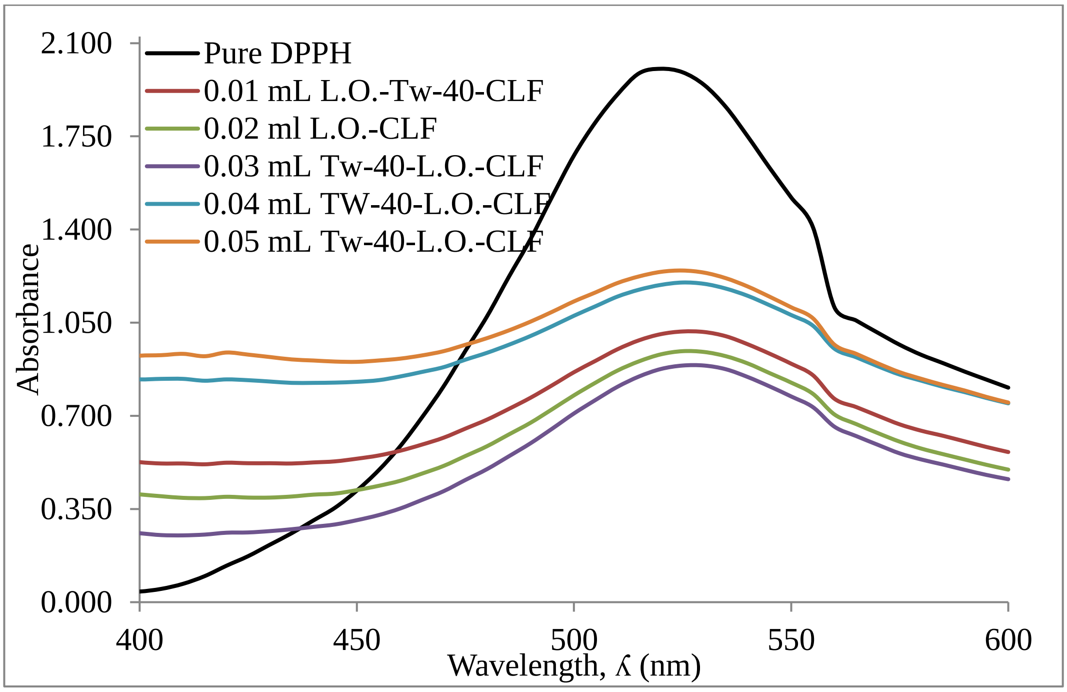


Pure DPPH
0.01 mL L.O. DTAB-CLF
0.02 mL DTAB-L.O.- CLF
0.03 mL DTAB-L.O.-CLF
0.04 mL DTAB-L.O.-CLF
0.05 mL- DTAB-L.O.-CLF
1.900
1.400
0.900
0.400
-0.100
-0.600
Absorbance
400
450
500
550
600
Wavelength (nm)

(b)

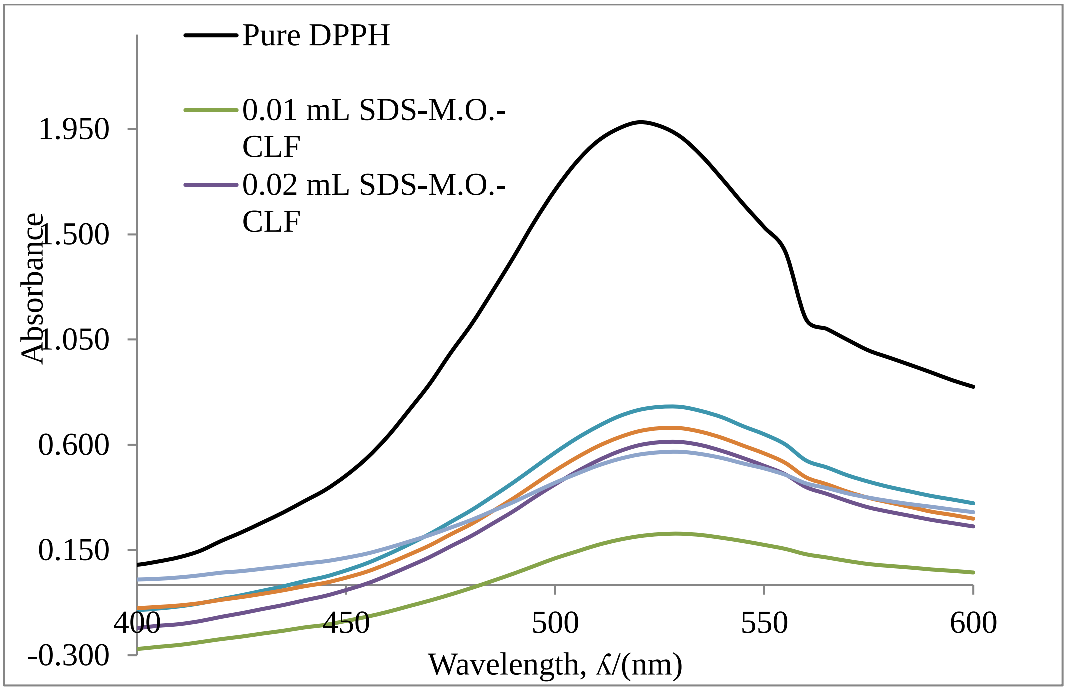

Pure DPPH
0.01 mL Tw-20 L.O. CLF
0.02 mL Tw-20 L.O. CLF
0.03 mL Tw-20 L.O. CLF
0.04 mL Tw-20 L.O. CLF
0.05 mL Tw-20 L.O. CLF
Absorbance
Wavellength, λ (nm)
1.5
1.3
1.1
0.9
0.7
0.5
0.3
0.1
-0.1
400
450
500
550
600

(c)


Pure DPPH
0.01 mL L.O.-Tw-40-CLF
0.02 ml L.O.-CLF
0.03 mL Tw-40-L.O.-CLF
0.04 mL TW-40-L.O.-CLF
0.05 mL Tw-40-L.O.-CLF
Absorbance
Wavelength, ʎ (nm)
2.100
1.750
1.400
1.050
0.700
0.350
0.000
400
450
500
550
600

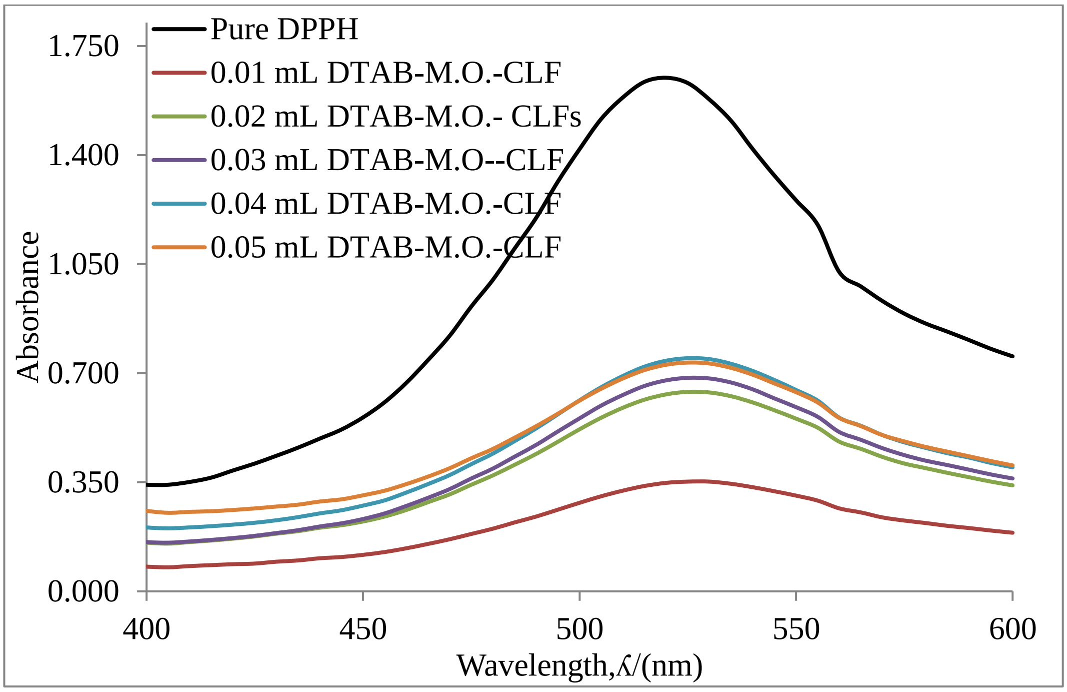
(d)

Fig. S5



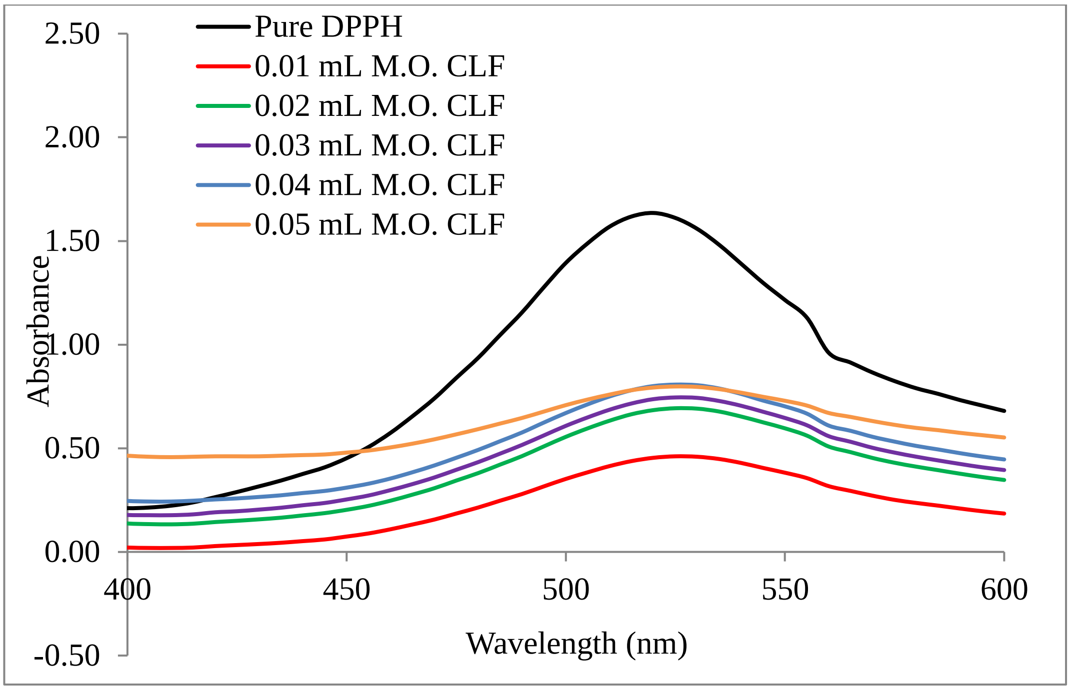
Pure DPPH
0.01 mL SDS-M.O.-CLF
0.02 mL SDS-M.O.-CLF
1.950
1.500
1.050
0.600
0.150
-0.300
Absorbance
400
450
500
550
600
Wavelength, ʎ/(nm)

(a)

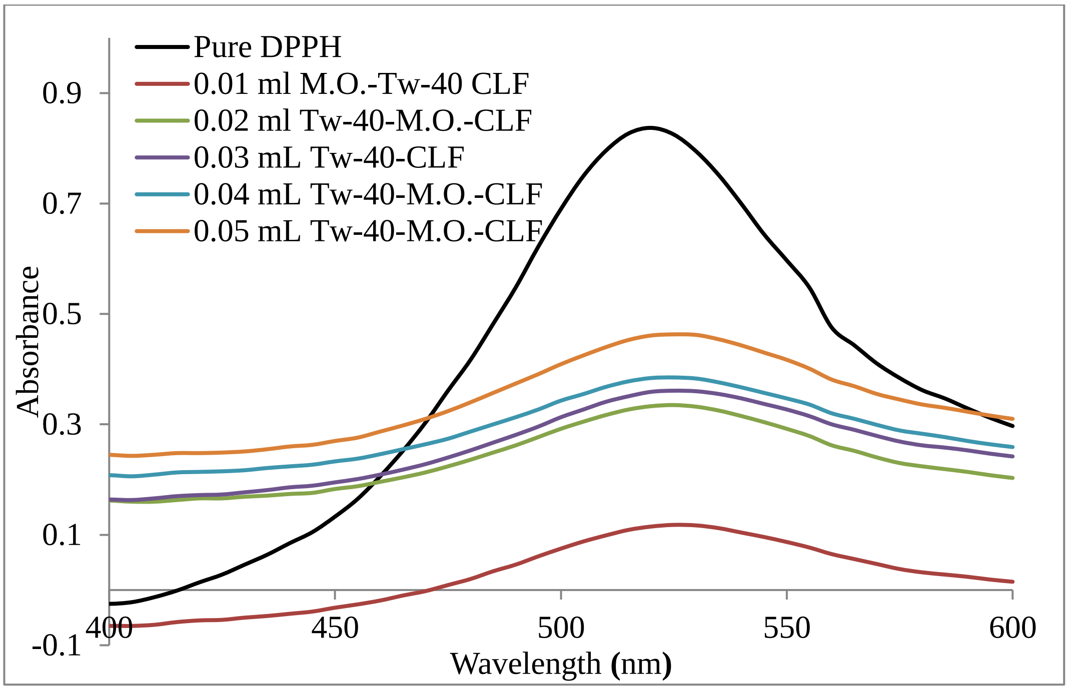


Pure DPPH
0.01 mL DTAB-M.O.-CLF
0.02 mL DTAB-M.O.- CLFs
0.03 mL DTAB-M.O--CLF
0.04 mL DTAB-M.O.-CLF
0.05 mL DTAB-M.O.-CLF
1.750
1.400
1.050
0.700
0.350
0.000
Absorbance
400
450
500
550
600
Wavelength,ʎ/(nm)

(b)

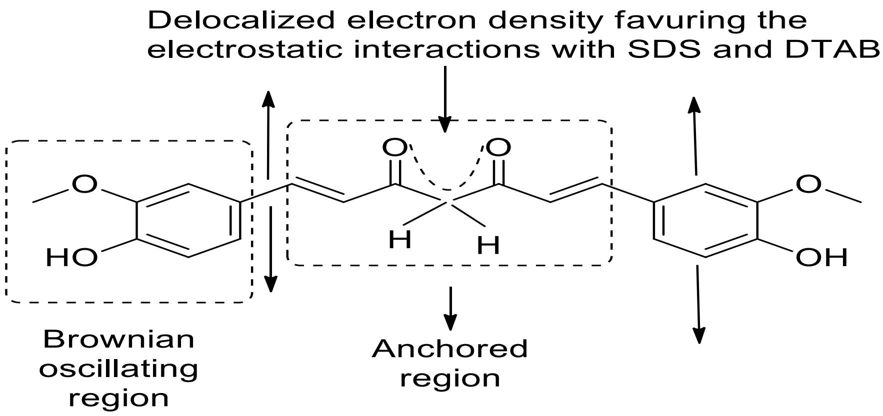

Pure DPPH
0.01 mL M.O. CLF
0.02 mL M.O. CLF
0.03 mL M.O. CLF
0.04 mL M.O. CLF
0.05 mL M.O. CLF
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
Absorbance
400
450
500
550
600
Wavelength (nm)

(c)

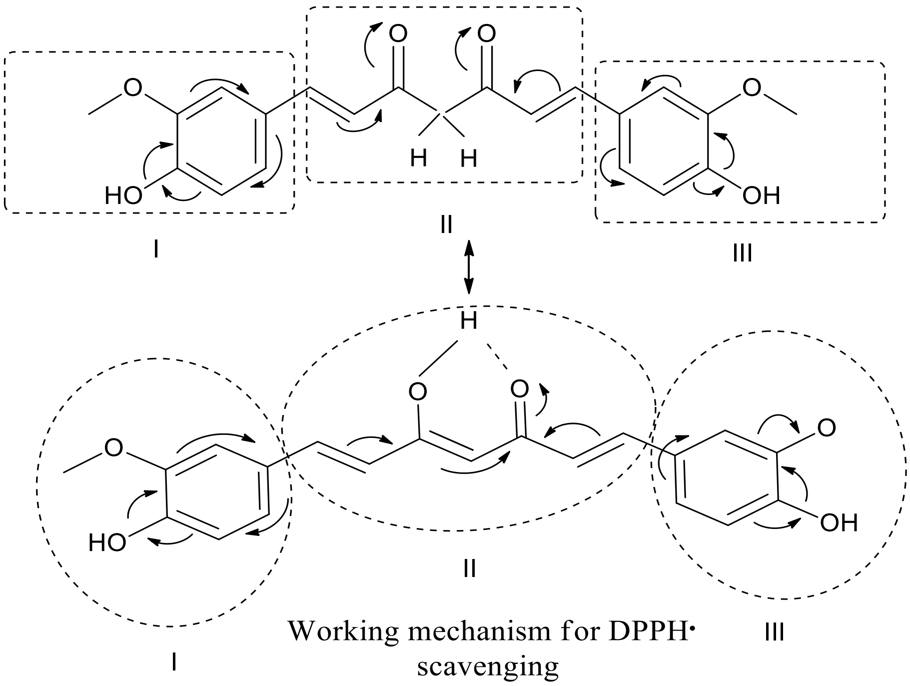

Pure DPPH
0.01 ml M.O.-Tw-40 CLF
0.02 ml Tw-40-M.O.-CLF
0.03 mL Tw-40-CLF
0.04 mL Tw-40-M.O.-CLF
0.05 mL Tw-40-M.O.-CLF
0.9
0.7
0.5
0.3
0.1
-0.1
Absorbance
400
450
500
550
600
Wavelength (nm)

(d)

Fig. S6


Delocalized electron density favuring the
electrostatic interactions with SDS and DTAB
O
O
O
HO
H
H
O
OH
Brownian
oscillating
region
Anchored
region

(a)


O
O
O
HO
H
H
O
OH
I
II
III
H
O
O
O
HO
O
OH
I
II
III
Working mechanism for DPPH•
scavenging

(b)

Fig. S7

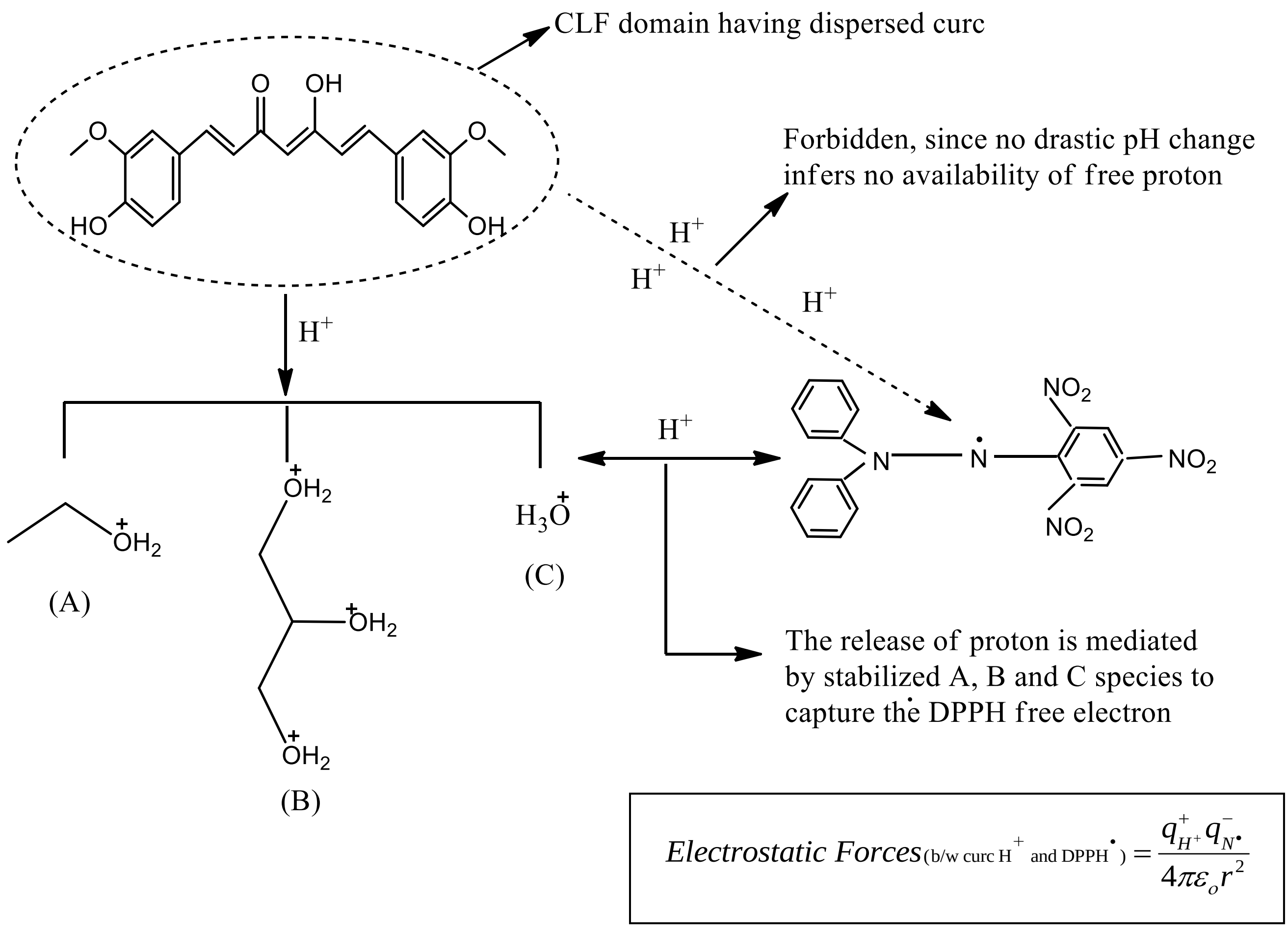
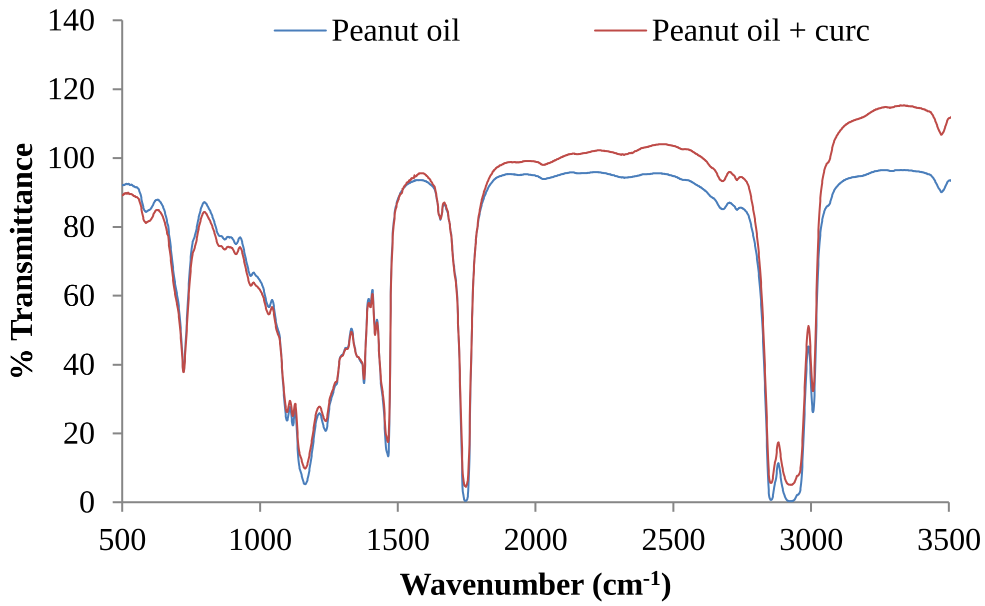
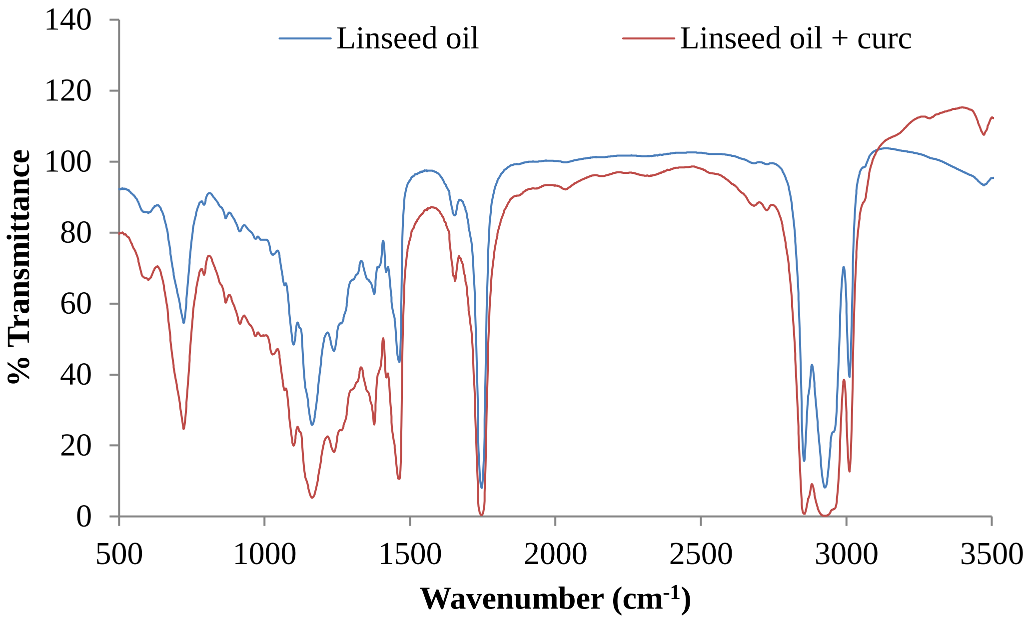


Fig.S8

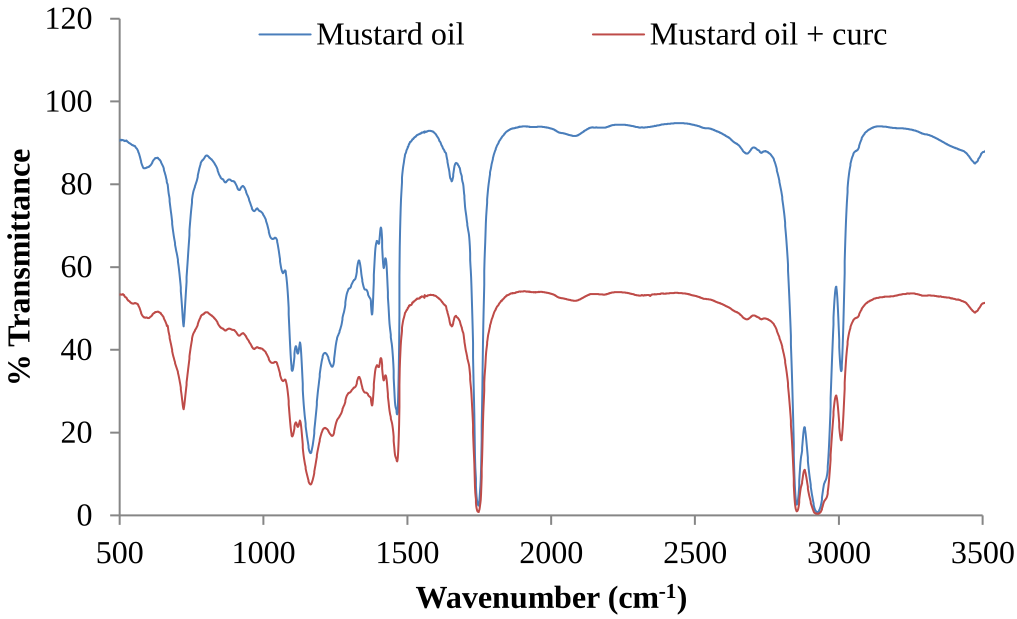


(a)



Linseed oil
Linseed oil + curc
% Transmittance
Wavenumber (cm-1)

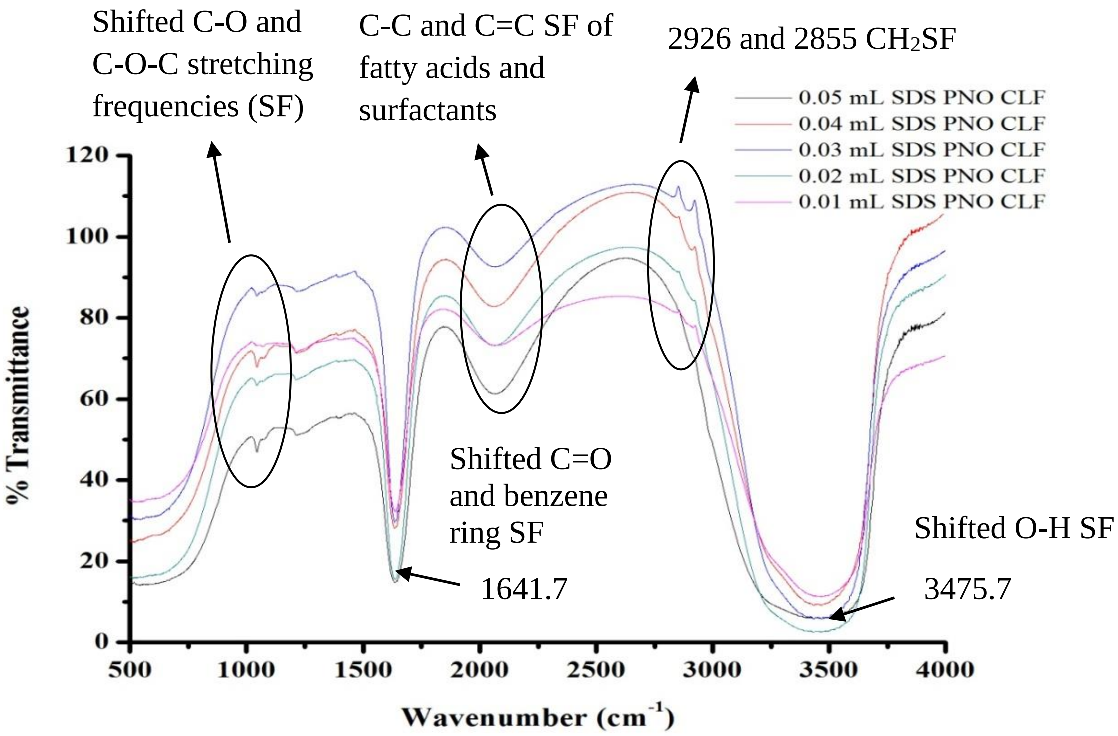
(b)



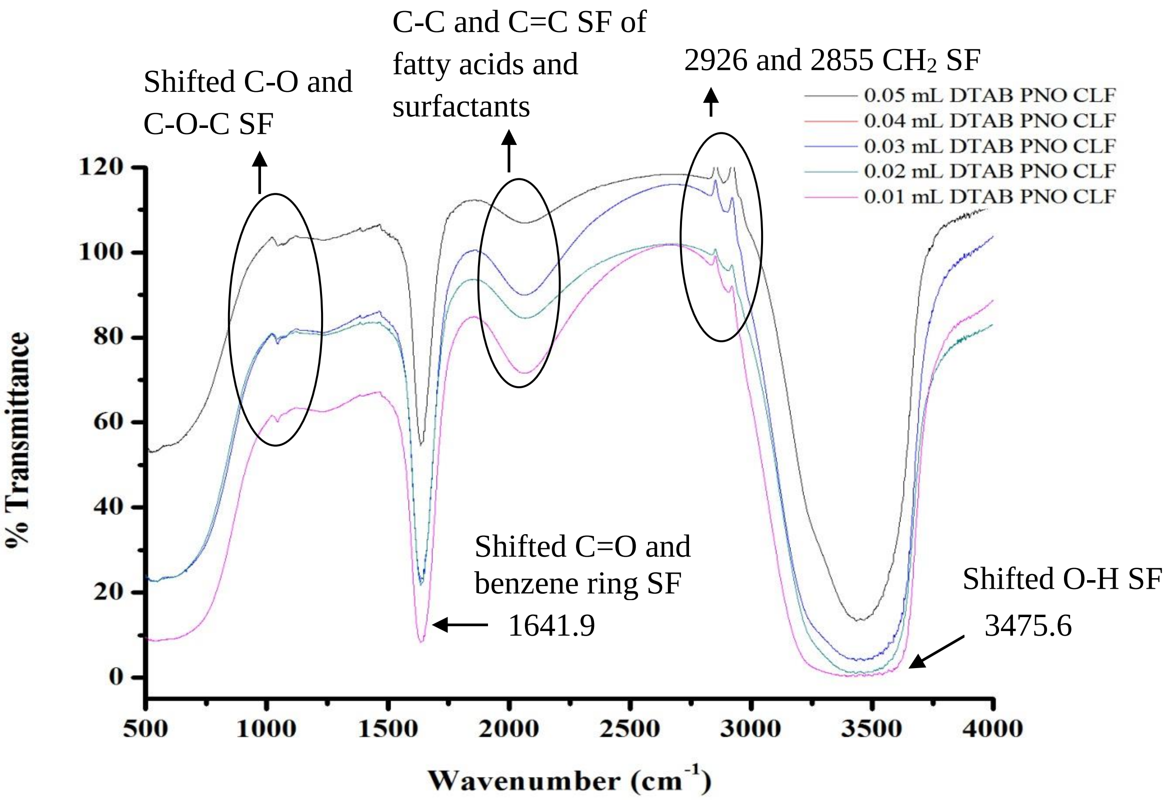
Mustard oil
Mustard oil + curc
% Transmittance
Wavenumber (cm-1)

(c)

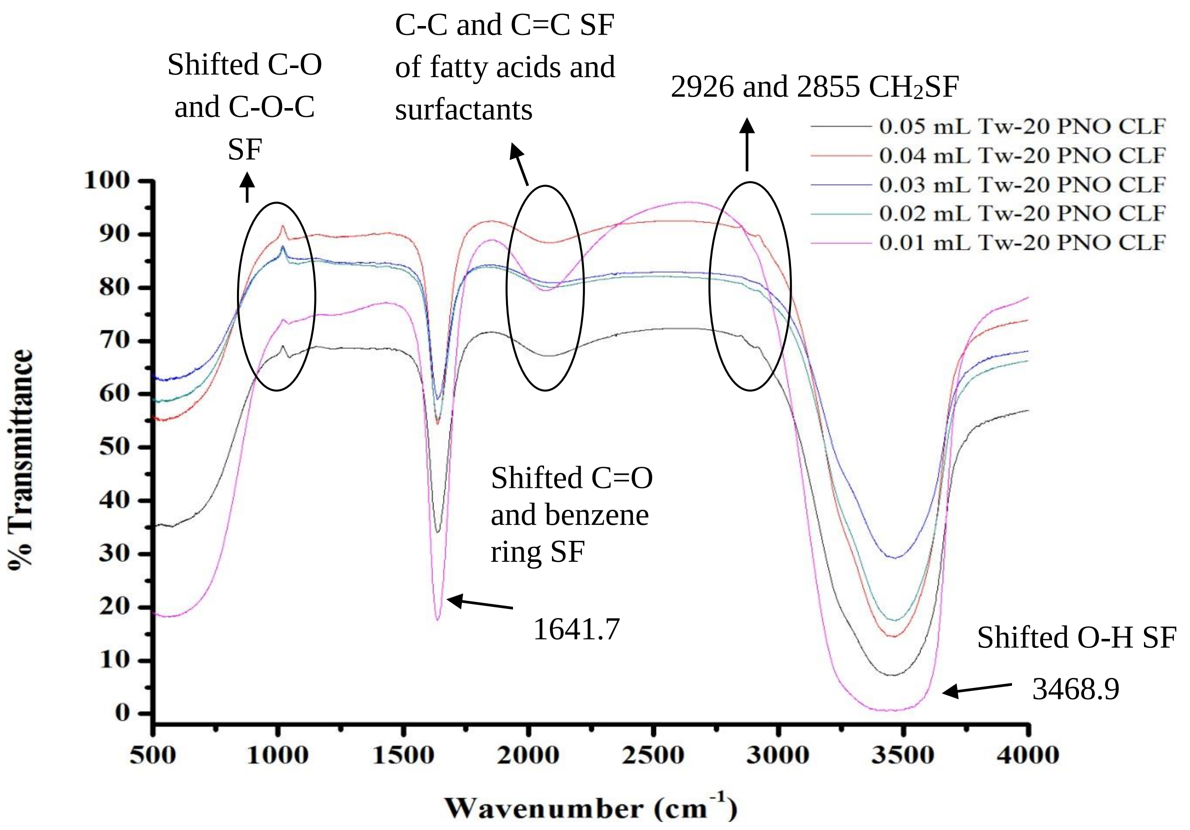
Fig.S9


Shifted C-O and
C-O-C stretching
frequencies (SF)
C-C and C=C SF of
fatty acids and
surfactants
2926 and 2855 CH2SF
0.05 mL SDS PNO CLF
0.04 mL SDS PNO CLF
0.03 mL SDS PNO CLF
0.02 mL SDS PNO CLF
0.01 mL SDS PNO CLF
Shifted C=O
and benzene
ring SF
1641.7
Shifted O-H SF
3475.7
% Transmittance
Wavenumber (cm-1)

(a)

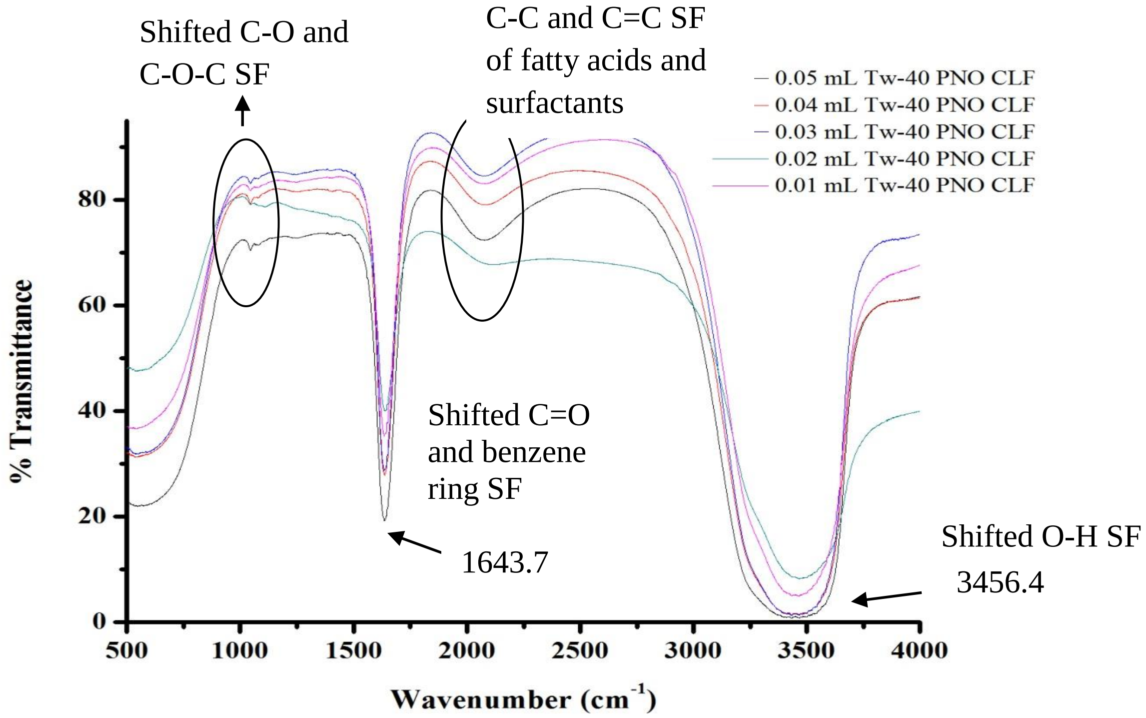

C-C and C=C SF of
fatty acids and
surfactants
2926 and 2855 CH2 SF
Shifted C-O and
C-O-C SF
0.05 mL DTAB PNO CLF
0.04 mL DTAB PNO CLF
0.03 mL DTAB PNO CLF
0.02 mL DTAB PNO CLF
0.01 mL DTAB PNO CLF
Shifted C=O and
benzene ring SF
1641.9
Shifted O-H SF
3475.6
% Transmittance
Wavenumber (cm-1)

(b)



Shifted C-O
and C-O-C
SF
C-C and C=C SF
of fatty acids and
surfactants
2926 and 2855 CH_2SF
0.05 mL Tw-20 PNO CLF
0.04 mL Tw-20 PNO CLF
0.03 mL Tw-20 PNO CLF
0.02 mL Tw-20 PNO CLF
0.01 mL Tw-20 PNO CLF
Shifted C=O
and benzene
ring SF
1641.7
Shifted O-H SF
3468.9
% Transmittance
Wavenumber (cm^{-1})

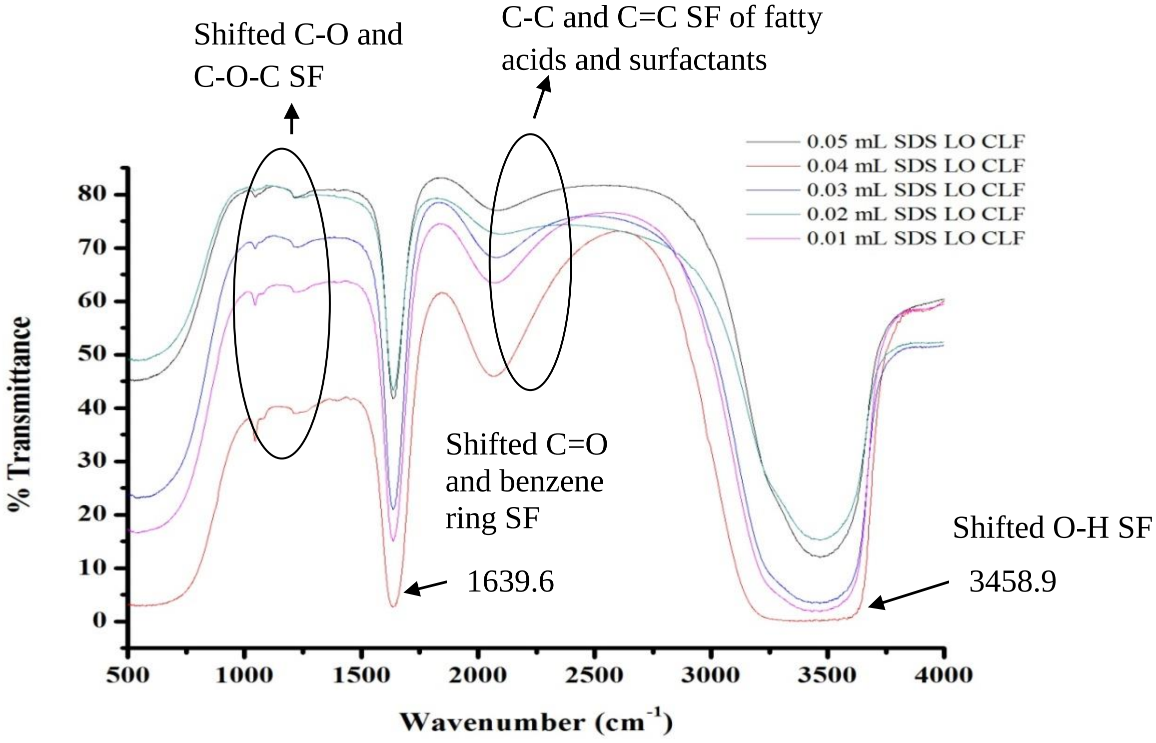
(c)



Shifted C-O and
C-O-C SF
C-C and C=C SF
of fatty acids and
surfactants
0.05 mL Tw-40 PNO CLF
0.04 mL Tw-40 PNO CLF
0.03 mL Tw-40 PNO CLF
0.02 mL Tw-40 PNO CLF
0.01 mL Tw-40 PNO CLF
Shifted C=O
and benzene
ring SF
1643.7
Shifted O-H SF
3456.4
% Transmittance
Wavenumber (cm^{-1})

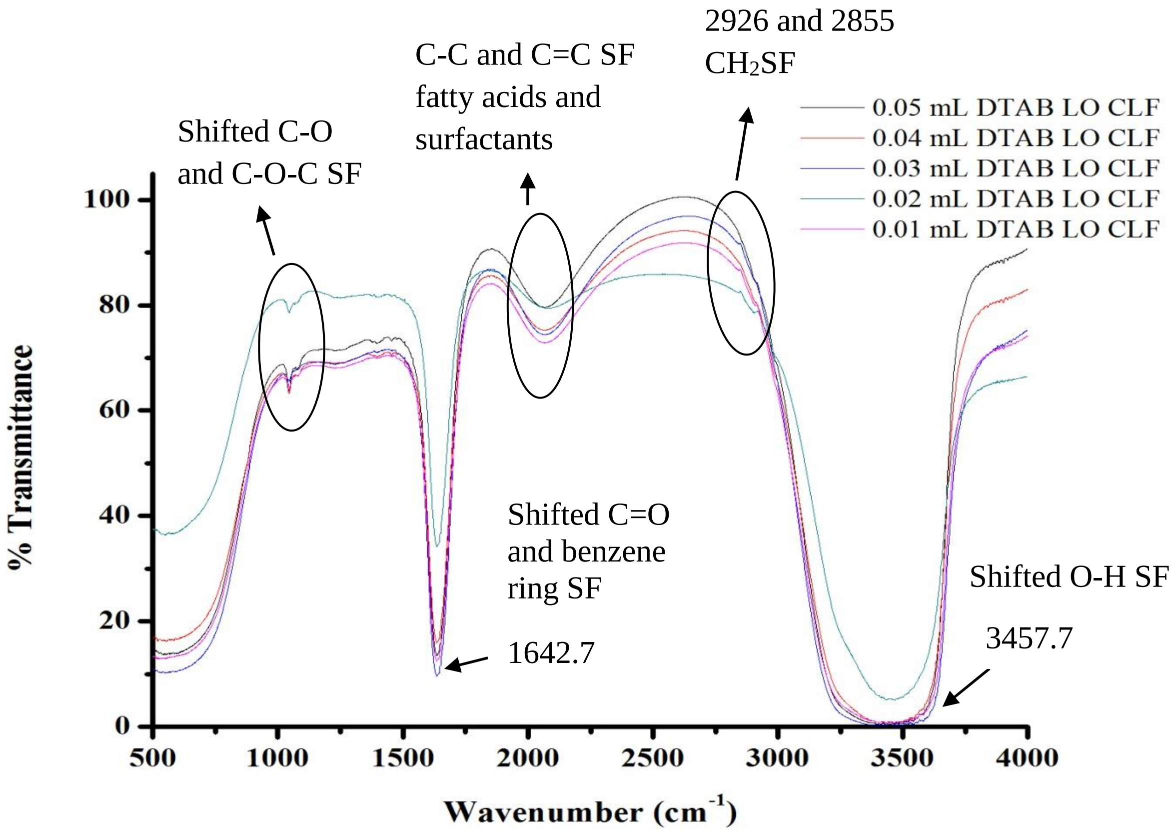
(d)

Fig.S10



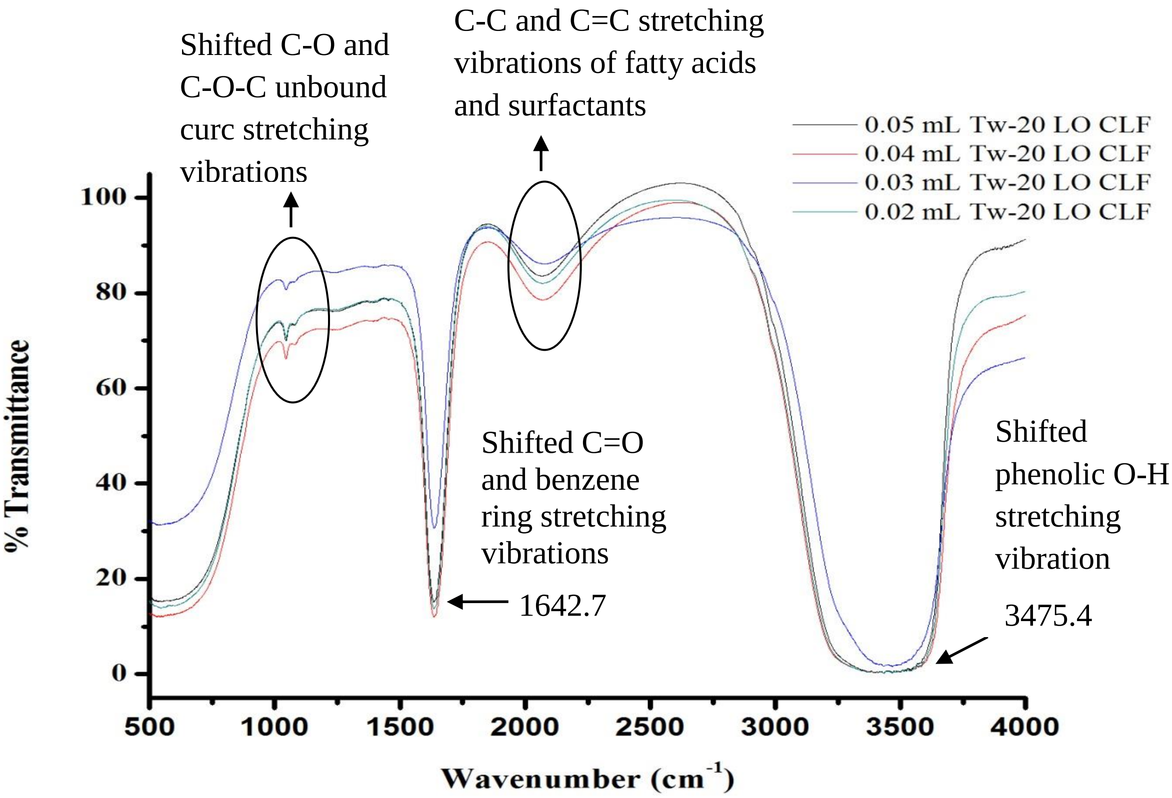
Shifted C-O and C-O-C SF
C-C and C=C SF of fatty acids and surfactants
0.05 mL SDS LO CLF
0.04 mL SDS LO CLF
0.03 mL SDS LO CLF
0.02 mL SDS LO CLF
0.01 mL SDS LO CLF
Shifted C=O and benzene ring SF
1639.6
Shifted O-H SF
3458.9
% Transmittance
Wavenumber (cm^{-1})

(a)



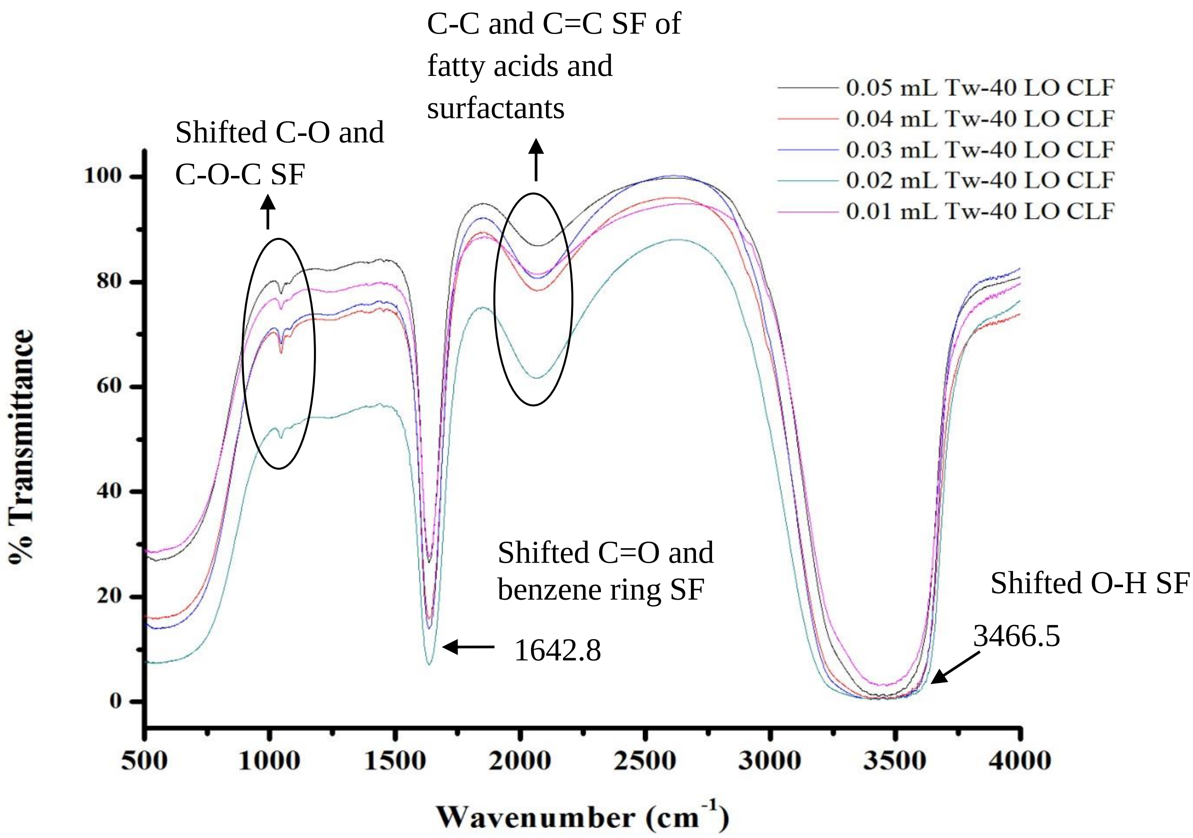
2926 and 2855 CH_2SF
C-C and C=C SF fatty acids and surfactants
Shifted C-O and C-O-C SF
0.05 mL DTAB LO CLF
0.04 mL DTAB LO CLF
0.03 mL DTAB LO CLF
0.02 mL DTAB LO CLF
0.01 mL DTAB LO CLF
Shifted C=O and benzene ring SF
1642.7
Shifted O-H SF
3457.7
% Transmittance
Wavenumber (cm^{-1})

(b)



Shifted C-O and C-O-C unbound curc stretching vibrations
C-C and C=C stretching vibrations of fatty acids and surfactants
0.05 mL Tw-20 LO CLF
0.04 mL Tw-20 LO CLF
0.03 mL Tw-20 LO CLF
0.02 mL Tw-20 LO CLF
Shifted C=O and benzene ring stretching vibrations
1642.7
Shifted phenolic O-H stretching vibration
3475.4
% Transmittance
Wavenumber (cm-1)

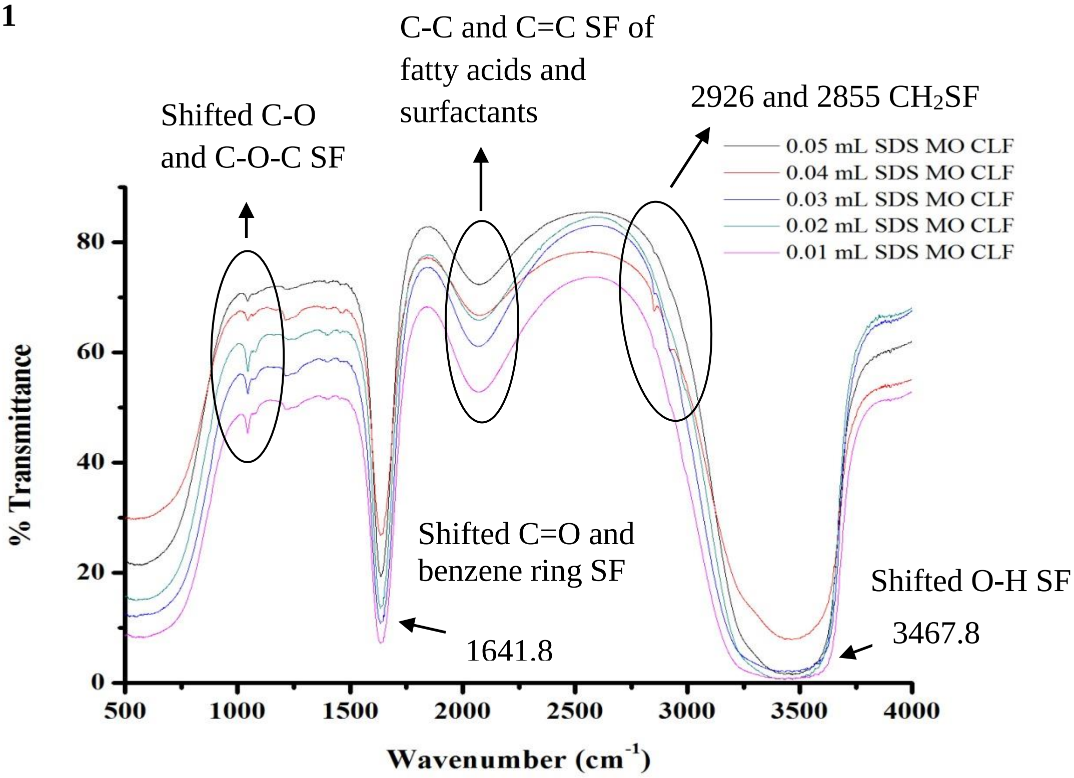
(c)



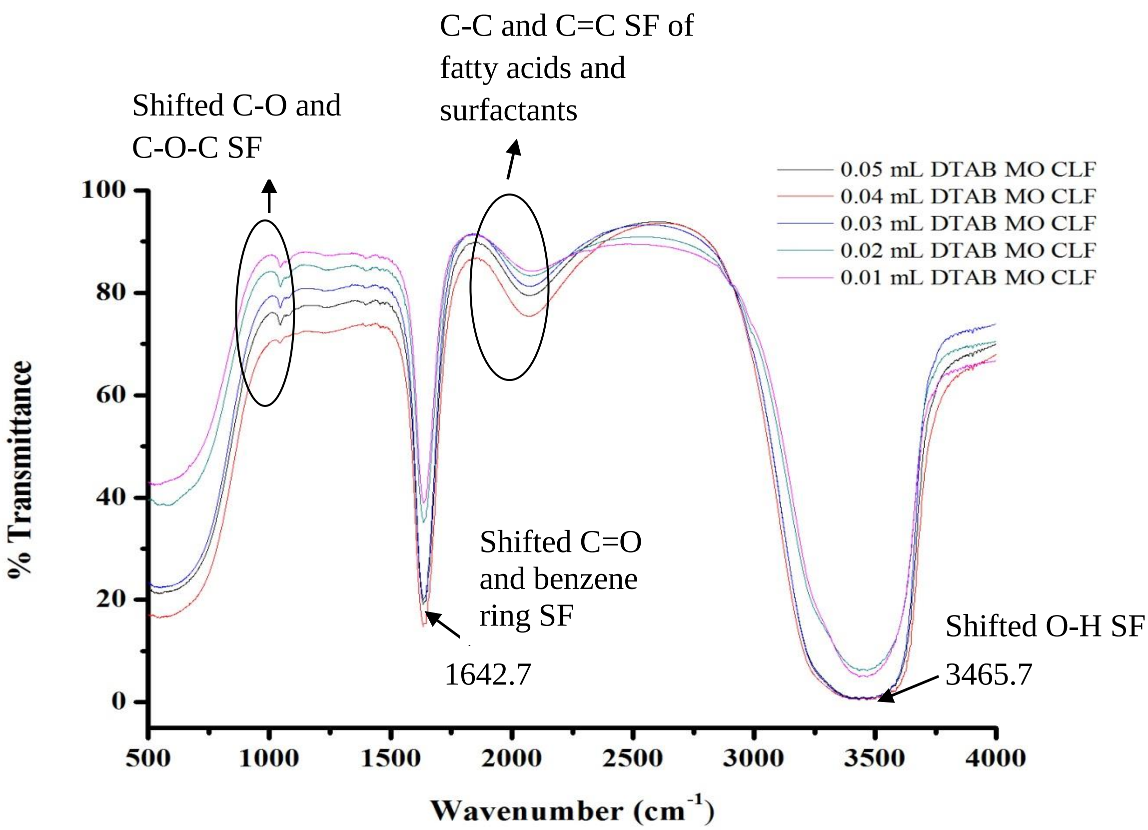
C-C and C=C SF of fatty acids and surfactants
Shifted C-O and C-O-C SF
0.05 mL Tw-40 LO CLF
0.04 mL Tw-40 LO CLF
0.03 mL Tw-40 LO CLF
0.02 mL Tw-40 LO CLF
0.01 mL Tw-40 LO CLF
Shifted C=O and benzene ring SF
1642.8
Shifted O-H SF
3466.5
% Transmittance
Wavenumber (cm-1)

(d)

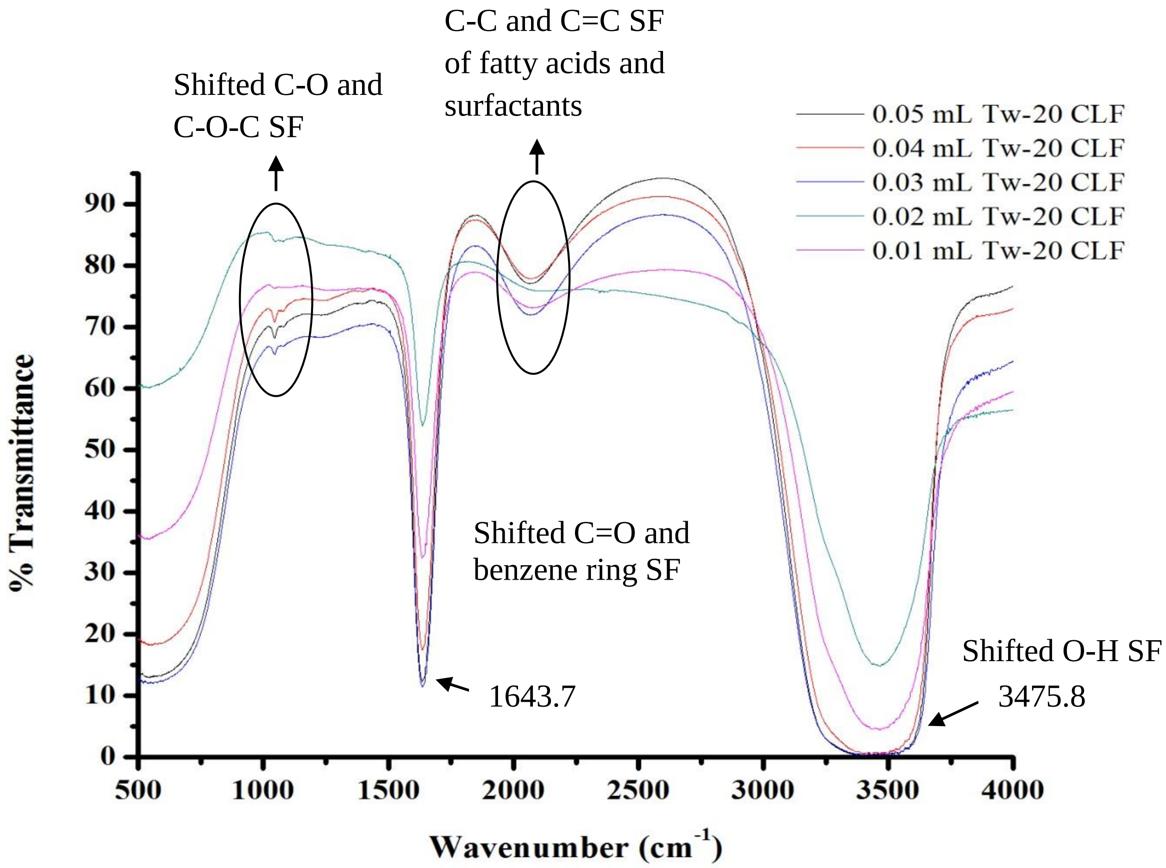
Fig.S11


C-C and C=C SF of
fatty acids and
surfactants
Shifted C-O
and C-O-C SF
2926 and 2855 CH2SF
0.05 mL SDS MO CLF
0.04 mL SDS MO CLF
0.03 mL SDS MO CLF
0.02 mL SDS MO CLF
0.01 mL SDS MO CLF
% Transmittance
Shifted C=O and
benzene ring SF
1641.8
Shifted O-H SF
3467.8
Wavenumber (cm-1)

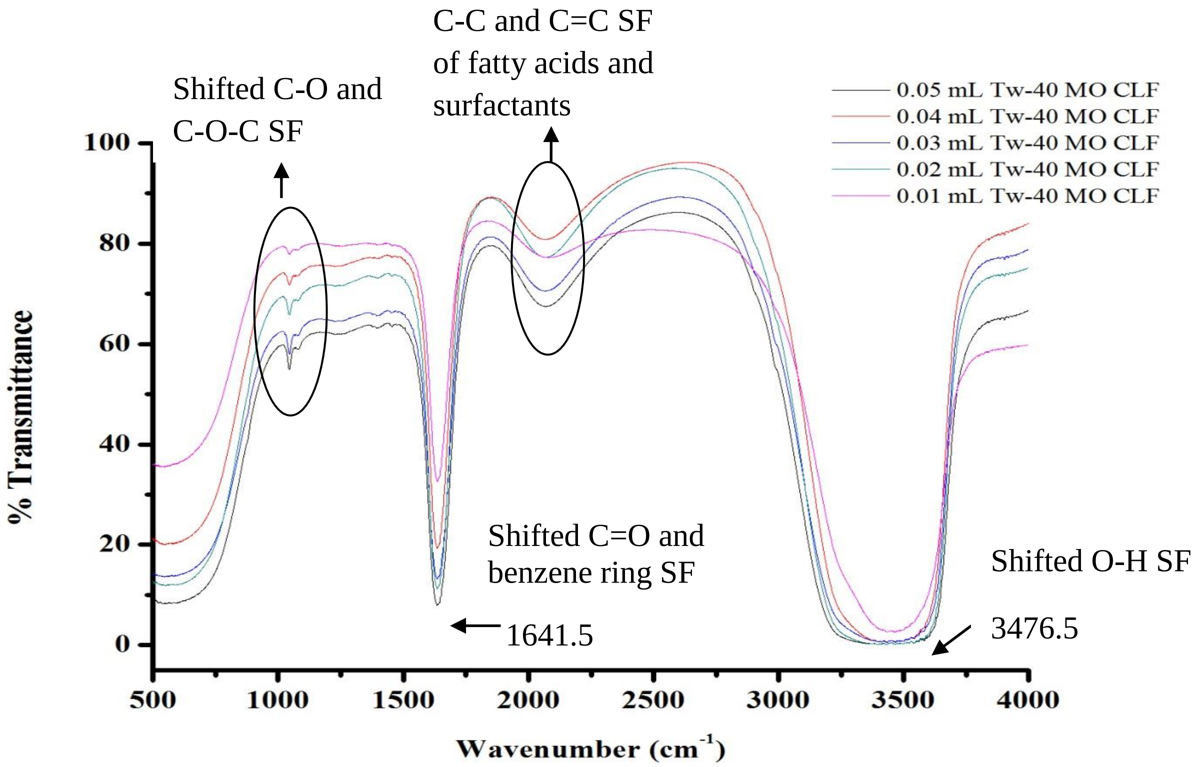
(a)


C-C and C=C SF of
fatty acids and
surfactants
Shifted C-O and
C-O-C SF
0.05 mL DTAB MO CLF
0.04 mL DTAB MO CLF
0.03 mL DTAB MO CLF
0.02 mL DTAB MO CLF
0.01 mL DTAB MO CLF
% Transmittance
Shifted C=O
and benzene
ring SF
1642.7
Shifted O-H SF
3465.7
Wavenumber (cm-1)

(b)

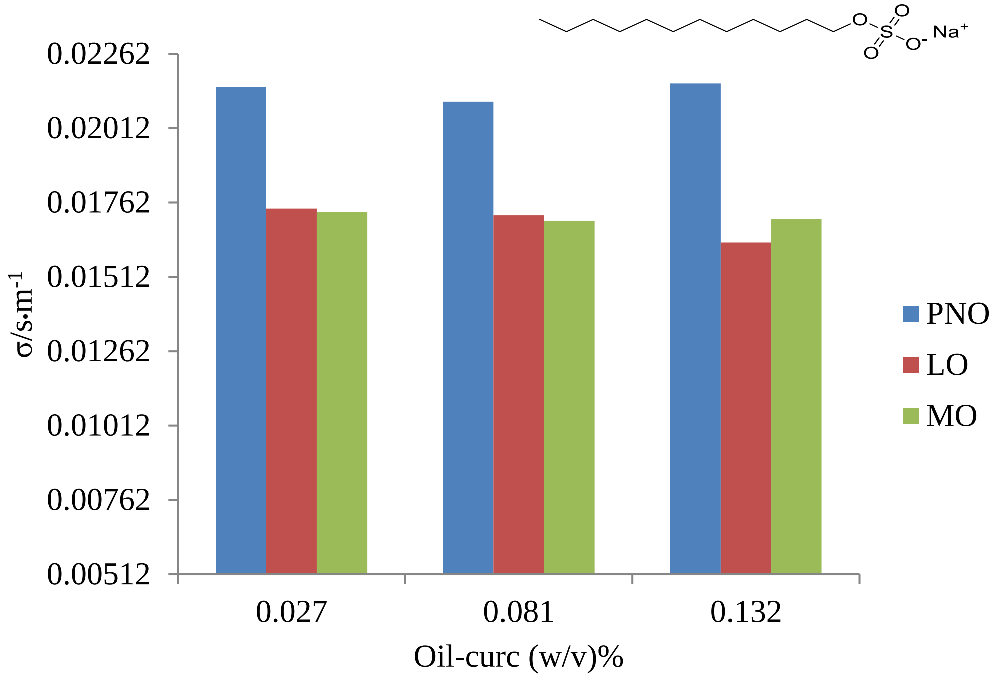

C-C and C=C SF
of fatty acids and
surfactants
Shifted C-O and
C-O-C SF
0.05 mL Tw-20 CLF
0.04 mL Tw-20 CLF
0.03 mL Tw-20 CLF
0.02 mL Tw-20 CLF
0.01 mL Tw-20 CLF
% Transmittance
Shifted C=O and
benzene ring SF
1643.7
Shifted O-H SF
3475.8
Wavenumber (cm-1)

(c)

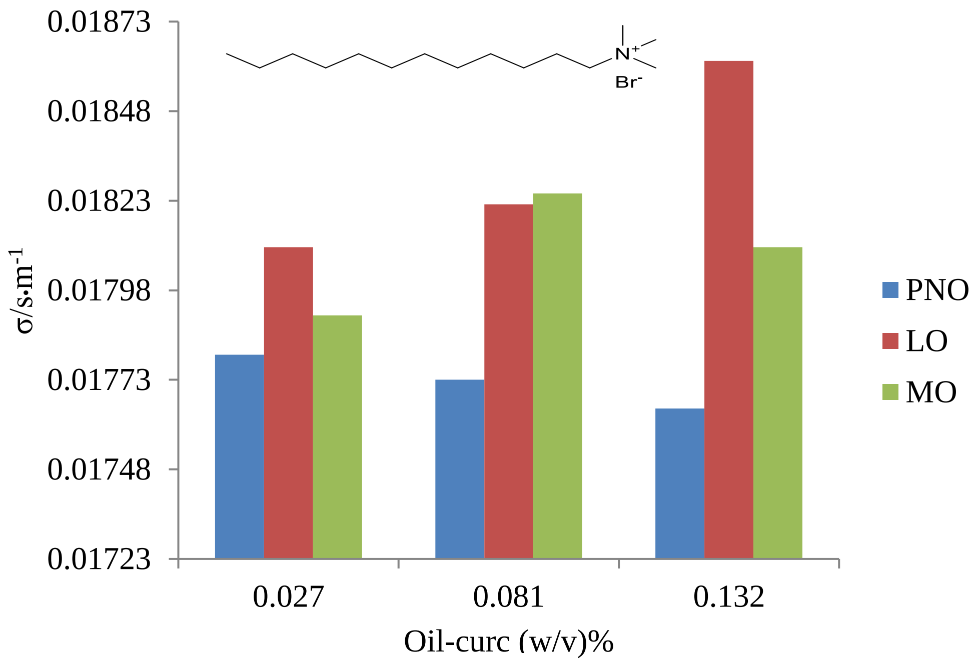

C-C and C=C SF
of fatty acids and
surfactants
Shifted C-O and
C-O-C SF
0.05 mL Tw-40 MO CLF
0.04 mL Tw-40 MO CLF
0.03 mL Tw-40 MO CLF
0.02 mL Tw-40 MO CLF
0.01 mL Tw-40 MO CLF
% Transmittance
Shifted C=O and
benzene ring SF
1641.5
Shifted O-H SF
3476.5
Wavenumber (cm-1)

(d)

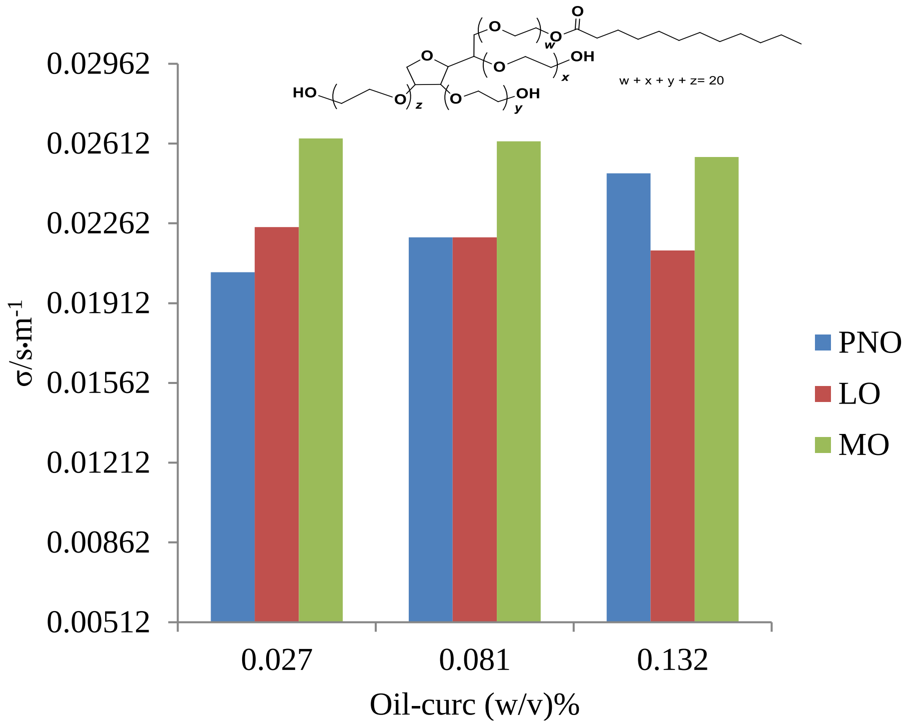
Fig. S12


O
S
O
O
O
Na+
0.02262
0.02012
0.01762
0.01512
0.01262
0.01012
0.00762
0.00512
σ/s·m-1
0.027
0.081
0.132
Oil-curc (w/v)%
PNO
LO
MO

(a)

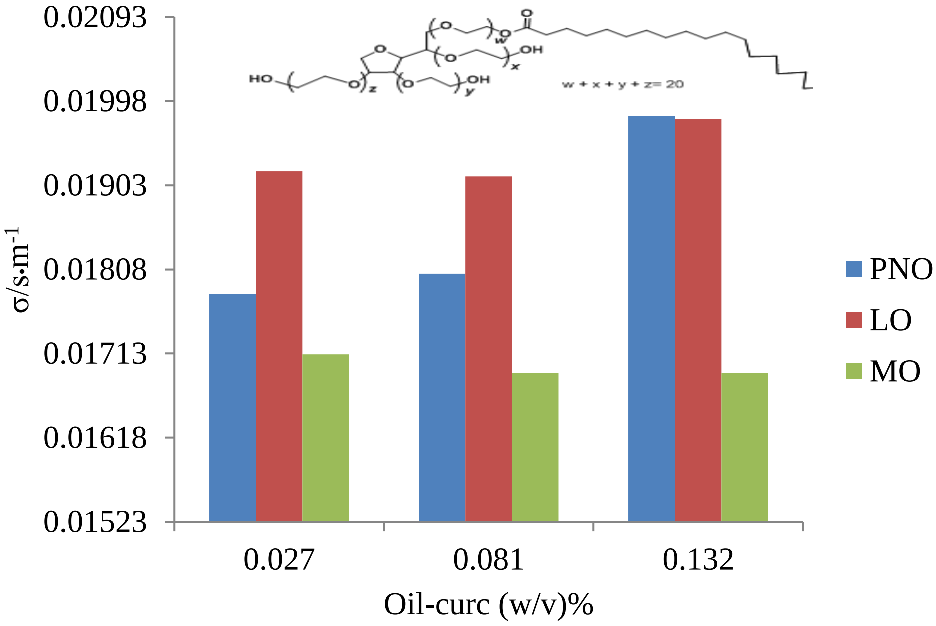

N+
Br-
0.01873
0.01848
0.01823
0.01798
0.01773
0.01748
0.01723
σ/s·m-1
0.027
0.081
0.132
Oil-curc (w/v)%
PNO
LO
MO

(b)



0.02962
0.02612
0.02262
0.01912
0.01562
0.01212
0.00862
0.00512
σ/s·m-1
0.027
0.081
0.132
Oil-curc (w/v)%
PNO
LO
MO
HO
OH
w + x + y + z= 20

(c)



0.02093
0.01998
0.01903
0.01808
0.01713
0.01618
0.01523
σ/s·m-1
0.027
0.081
0.132
Oil-curc (w/v)%
PNO
LO
MO
HO
OH
w + x + y + z= 20

(d)

Figure Legends

Fig.S1. Comparative interactions of ionic and nonionic surfactants highlighting the surface segregation of water for ionic surfactantsdue to head group and counterion activities. The nonionic tweens with no room for Coulombic electrostatic forces of attraction/repulsion facilitate comparatively finer curc dispersion.

Fig.S2. Pictorial representation of varying dispersion configurations of curc, which can be functional colloidal assemblies of hydrophilic-hydrophobic networks (PDI>1) or can be monodispersive, for a uniform distribution of curc (PDI<1) (Suppl. Table 2).

Fig.S3. UV spectra for most DPPH$^{\bullet}$ FRSAs, with peanut oil. The highest reduction of absorbance within characteristic region of (500-520) nm reflects the most efficient antioxidant expression of curc. The (0.01 to 0.05) mL oil-curc volumes are equivalent of their (w/v)% contents.

Fig.S4. UV spectra for most DPPH$^{\bullet}$ FRSAs, with linseed oil. The highest reduction of absorbance within characteristic region of (500-520) nm reflects the most efficient antioxidant expression of curc. The (0.01 to 0.05) mL oil-curc volumes are equivalent of their (w/v)% contents.

Fig.S5. UV spectra for most DPPH$^{\bullet}$ FRSAs, with mustard oil. The highest reduction of absorbance within characteristic region of (500-520) nm reflects the most efficient antioxidant expression of curc. The (0.01 to 0.05) mL oil-curc volumes are equivalent of their (w/v)% contents.

Fig.S6. A schematic representation of the diffused electron density (DED) on the central β-diketonic backbone of curc. The extended pi-conjugation from the symmetrical phenyl rings and the alternate double bonds in the diketonic linkage are the contributing factors.

Fig.S7. Proton accommodating tendencies of ethanol, glycerol and water enhance the stability of CLFs which do not show any drastic change in pH. Hence, the scavenging of nascent electron in DPPH$^{\bullet}$ is caused by proximity driven H^+ release from A, B and C species.

Fig.S8.FTIR spectra of (a) peanut oil (neat) and with curc, (b) mustard oil (neat) and with curc, and (c) linseed oil (neat) and with curc. Greater overlap (of spectral peaks) for peanut and linseed oil infers a stronger binding over mustard oil.

Fig.S9. FTIR spectra of (a) SDS, (b) DTAB, (c) Tw-20 and (d) Tw-40 stabilized CLFs with peanut oil. The characteristic peaks, within (1500-1750), (2000-2200) and ~3500 cm^{-1} infers a structural reproducibility of all formulations. The (0.01 to 0.05) mL oil-curc volumes are equivalent of their (w/v)% contents.

Fig.S10. FTIR spectra of (a) SDS, (b) DTAB, (c) Tw-20 and (d) Tw-40stabilized CLFs with linseed oil. The characteristic peaks, within (1500-1750), (2000-2200) and ~3500 cm^{-1} infers a structural reproducibility of all formulations. The (0.01 to 0.05) mL oil-curc volumes are equivalent of their (w/v)% contents.

Fig.S11. FTIR spectra of (a) SDS, (b) DTAB, (c) Tw-20 and (d) Tw-40stabilized CLFs with mustard oil. The characteristic peaks, within (1500-1750), (2000-2200) and ~3500 cm^{-1} infers a structural reproducibility of all formulations. The (0.01 to 0.05) mL oil-curc volumes are equivalent of their (w/v)% contents.

Fig.S12. Variations of friccohesities (σ) with respect to increasing (w/v)% of oil-curc with (a) SDS, (b) DTAB, (c) Tw-20 and (d) Tw-40. Higher σ for peanut oil with SDS, linseed oil with DTAB, mustard oil with Tw-20 and linseed oil with Tw-40 inferred the maximum dispersion behaviour. For mustard oil, the oil-curc (w/v)% are 0.026, 0.078 and 0.130.