

## Supporting Information

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# Evaluation of Essential Oil Components in Genetically Modified Poaceae Plants: A Comparative Study of Their Whitening and Antioxidant Activities In Vitro

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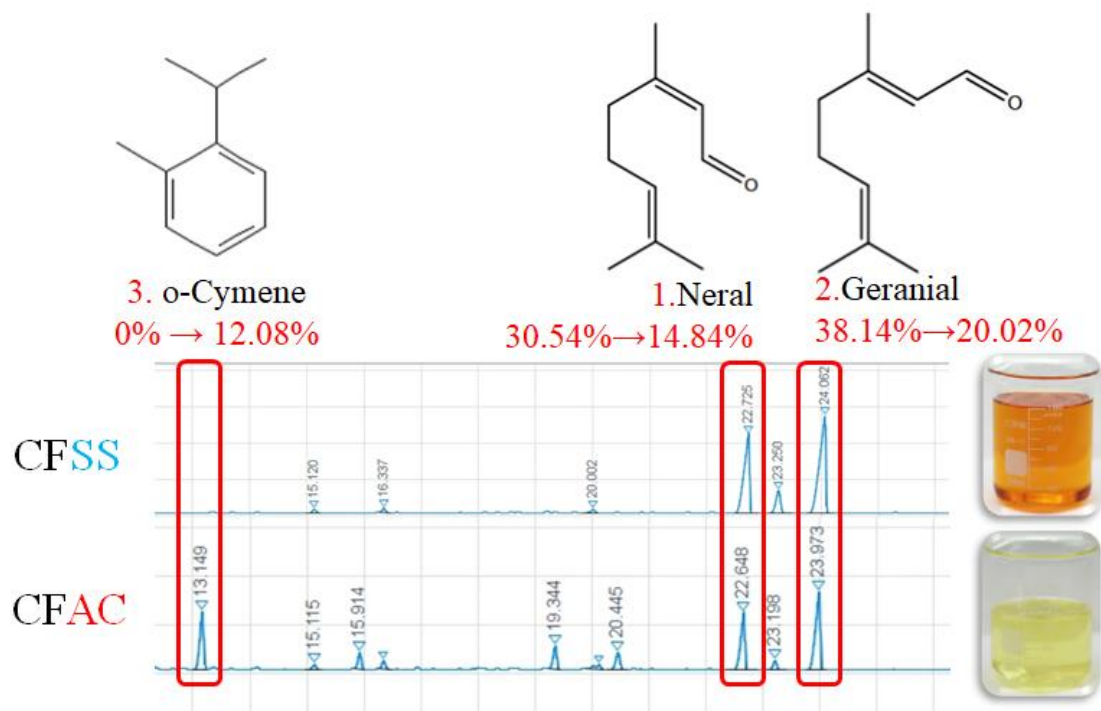
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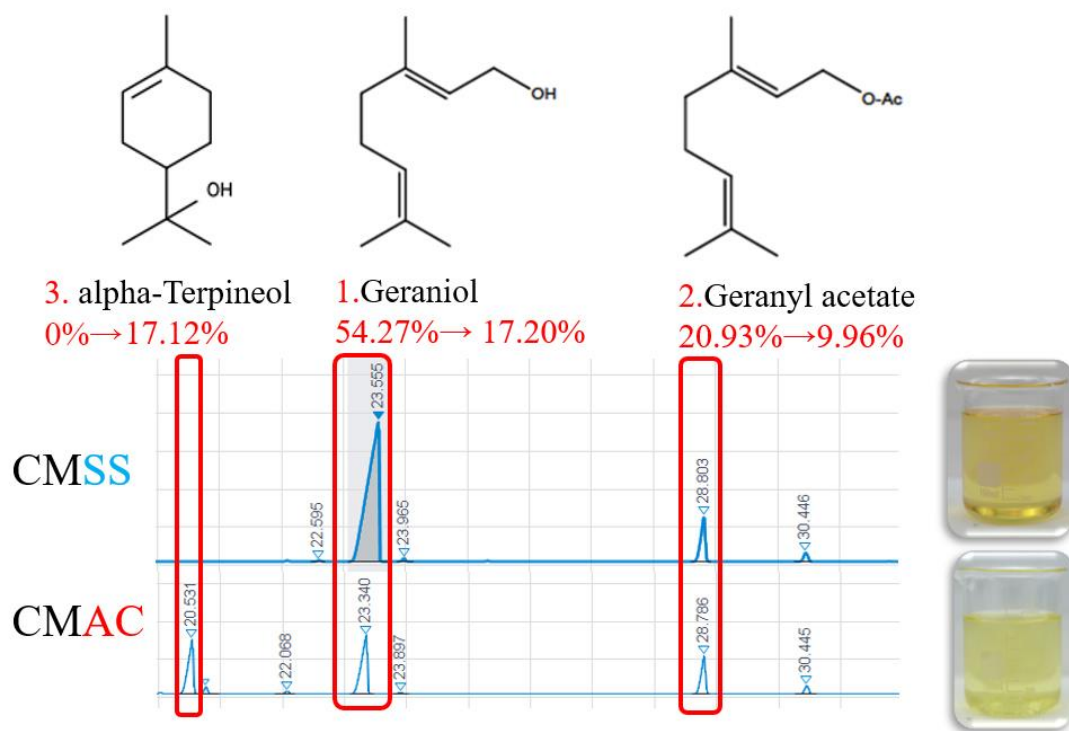
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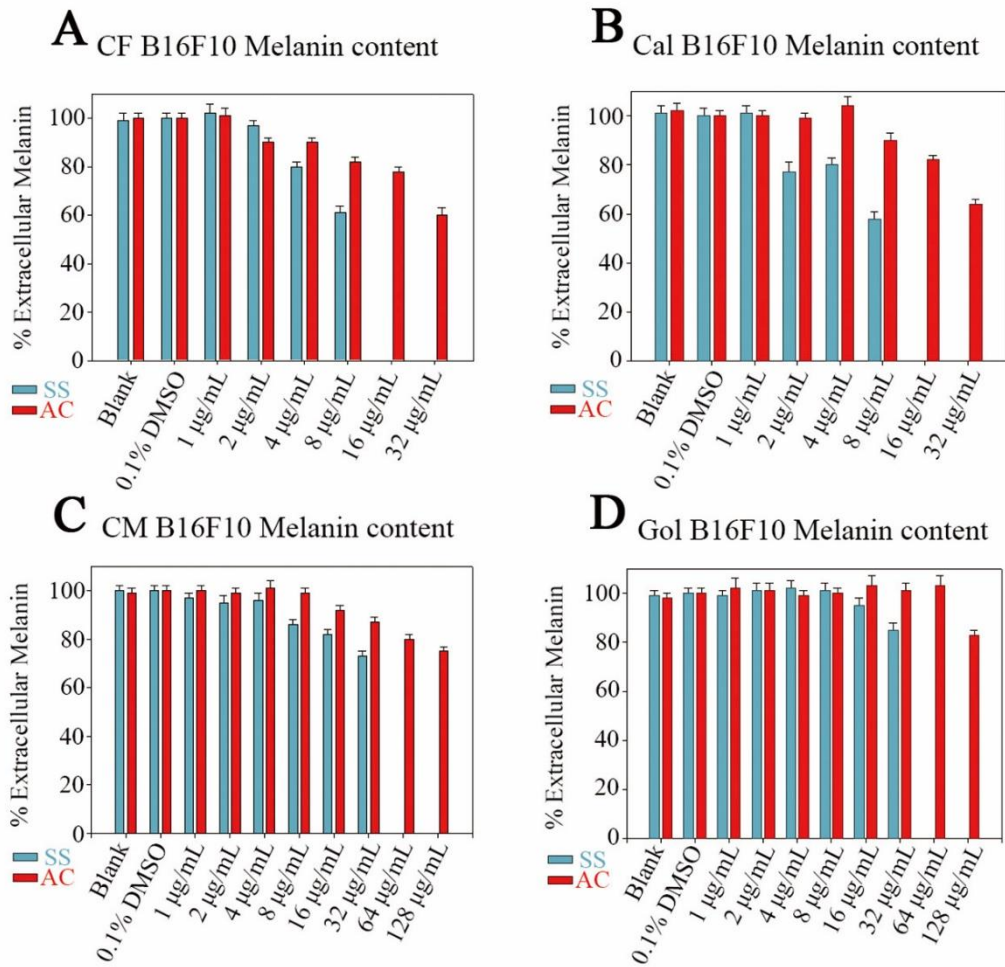
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**Figure S1:** GC-FID chromatograms and images of CFSS and CMAC.

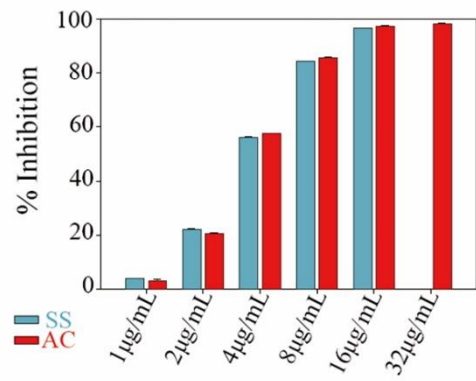


**Figure S2:** GC-FID chromatograms and images of CMSS and CMAC.

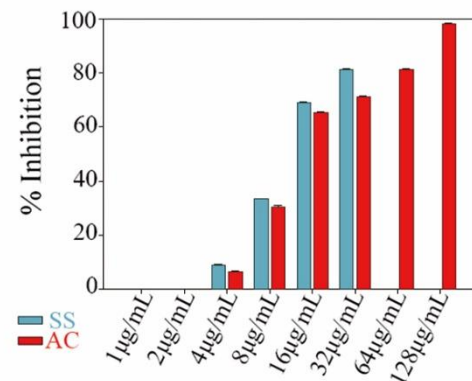


**Figure S3:** Influence of CFSS and CFAC (A), CalSS and CalAC (B), CMSS and CMAC (C), and GolSS and GolAC (D) on intracellular melanin content in B16-F10 cells after 24 hours of exposure (n = 3).

**A** CF ABTS radical scavenging activity

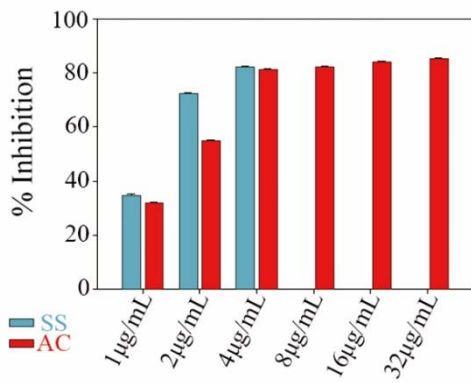


**B** CM ABTS radical scavenging activity

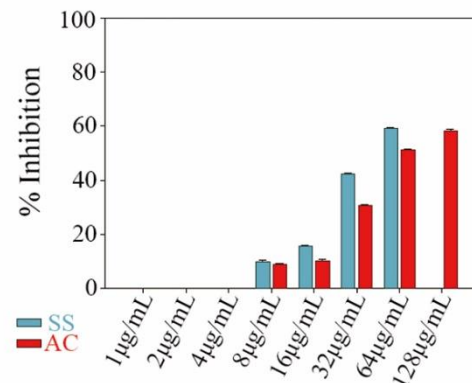


**Figure S4:** The ABTS radical scavenging assay was used to evaluate the free radical-scavenging abilities of CFSS and CFAC (A) and CMSS and CMAC (B). (n=3).

**A** CF DPPH radical scavenging activity



**B** CM DPPH radical scavenging activity



**Figure S5:** The DPPH radical scavenging assay was used to evaluate the free radical-scavenging abilities of CFSS and CFAC (A) and CMSS and CMAC (B). (n=3).



**Table S1:** GC-MS of CFSS, CFAC, CalSS and CalAC.

KI	Constituent	% Area				Method of Identification
		CFSS	CFAC	CalSS	CalAC	
954	Camphene	2.08	1.56			MS;KI;RC
975	Geranic oxide		0.86			MS;KI
986	Methyl heptenone	1.8	1.25			MS;KI
994	Dehydrocineole		0.81			MS;KI
1002	$\delta$ -2-Carene		0.71			MS;KI
1022	<i>o</i> -Cymene		12.08		15.56	MS;KI
1029	D-Limonene		0.81			MS;KI;RC
1037	$\beta$ -Ocimene		0.65			MS;KI
1090	4-Nonanone	1.36	1.34			MS;KI;RC
1091	<i>p</i> -Cymene		5.56		8.67	MS;KI;RC
1096	Linalool	2.1	2.78			MS;KI
1110	1,3,8- <i>p</i> -Menthatriene		0.69		0.96	MS;KI
1113	6-Camphenol		0.79		1.02	MS;KI
1153	Citronellal		0.74			MS;KI;RC
1166	$\delta$ -Terpineol		8.31		10.76	MS;KI
1180	Isogeranial	1.21	1.4		2.06	MS;KI
1188	$\alpha$ -Terpineol		4.03		6.23	MS;KI;RC
1238	Neral	30.54	14.84	51.71	23.61	MS;KI;RC
1252	Geraniol	2.16	3.47			MS;KI;RC
1267	Geranial	38.14	20.02	48.29	26.97	MS;KI;RC
1381	Geranyl acetate	7.41	5.71			MS;KI
1408	(Z)-Caryophyllene	4.55	3.78			MS;KI
1451	(E)-Isoeugenol	1.52	0.82			MS;KI
1479	$\gamma$ -Muurolene	4.47	3.02			MS;KI
1523	$\delta$ -Cadinene		1.33			MS;KI
1583	Caryophyllene oxide	1.41	0.65			MS;KI

Identification Methods: Mass Spectrum (MS), Kovats Index (KI), and Reference Compound (RC).

**Table S2:** Analog of CFSS

Type	Names	% Area	Type	% Area
aldehyde	Isogeranial	1.21	aldehyde	69.89
aldehyde	Neral	30.54	ester	7.41
aldehyde	Geranial	38.14	ketone	3.16
ester	Geranyl acetate	7.41	monoterpene	2.08
ketone	Methyl heptenone	1.8	monoterpenol	4.26
ketone	4-Nonanone	1.36	other oxide	1.41
monoterpene	Camphene	2.08	phenol	1.52
monoterpenol	Linalool	2.1	sesquiterpene	9.02
monoterpenol	Geraniol	2.16		
other oxide	Caryophyllene oxide	1.41		
phenol	(E)-Isoeugenol	1.52		
sesquiterpene	(Z)-Caryophyllene	4.55		
sesquiterpene	$\gamma$ -Muurolene	4.47		

**Table S3:** Analog of CFAC

Type	Names	% Area	Type	% Area
aldehyde	Citronellal	0.74	aldehyde	37
aldehyde	Isogeranial	1.4	ester	5.71
aldehyde	Neral	14.84	ketone	2.59
aldehyde	Geranial	20.02	monoterpene	22.85
ester	Geranyl acetate	5.71	monoterpenol	18.59
ketone	Methyl heptenone	1.25	other oxide	2.32
ketone	4-Nonanone	1.34	phenol	0.82
monoterpene	Camphene	1.56	sesquiterpene	8.13
monoterpene	$\delta$ -2-Carene	0.71		
monoterpene	<i>o</i> -Cymene	12.08		
monoterpene	D-Limonene	0.81		
monoterpene	beta-Ocimene	0.65		
monoterpene	<i>p</i> -Cymene	5.56		
monoterpene	1,3,8- <i>p</i> -Menthatriene	0.69		
monoterpene	6-Camphenol	0.79		
monoterpenol	Linalool	2.78		
monoterpenol	$\delta$ -Terpineol	8.31		
monoterpenol	$\alpha$ -Terpineol	4.03		
monoterpenol	Geraniol	3.47		
other oxide	Geranic oxide	0.86		
other oxide	Dehydrocineole	0.81		
other oxide	Caryophyllene oxide	0.65		
phenol	(E)-Isoeugenol	0.82		
sesquiterpene	(Z)-Caryophyllene	3.78		
sesquiterpene	$\gamma$ -Muurolene	3.02		
sesquiterpene	$\delta$ -Cadinene	1.33		

**Table S4:** Analog of CalAC

Type	Names	% Area	Type	% Area
aldehyde	Isogeranial	2.06	aldehyde	52.64
aldehyde	Neral	23.61	monoterpene	26.21
aldehyde	Geranial	26.97	monoterpenol	16.99
monoterpene	<i>o</i> -Cymene	15.56		
monoterpene	<i>p</i> -Cymene	8.67		
monoterpene	1,3,8- <i>p</i> -Menthatriene	0.96		
monoterpene	6-Camphenol	1.02		
monoterpenol	$\delta$ -Terpineol	10.76		
monoterpenol	$\alpha$ -Terpineol	6.23		

**Table S5:** GC-MS of CMSS, CMAC, GolSS and GolAC.

KI	Constituent	% Area				Method of Identification
		CM SS	CM AC	Gol SS	Gol AC	
975	Geranic oxide		5.15		6.36	MS;KI
990	$\beta$ -Myrcene		0.95		1.35	MS;KI;RC
1014	1,4-Cineole		0.67		1.17	MS;KI
1017	$\alpha$ -Terpinolene		0.83		1.2	MS;KI
1022	<i>o</i> -Cymene		0.54			MS;KI
1029	D-Limonene		2.14		3.38	MS;KI
1031	1,8-Cineole		0.88		1.41	MS;KI;RC
1037	(Z)- $\beta$ -Ocimene		1.6		2.05	MS;KI
1045	Ocimen quintoxide		1.64		3.01	MS;KI
1050	(E)- $\beta$ -Ocimene	3.54	3.25			MS;KI
1054	$\gamma$ -Terpinene				0.76	MS;KI
1088	Terpinolene		3.17		5.54	MS;KI;RC
1096	Linalool	6.16	13.5		14.16	MS;KI;RC
1122	Myrcenol		1.56		2.47	MS;KI
1133	1-Terpineol		0.7		1.22	MS;KI
1163	cis- $\beta$ -Terpineol		1.3		2.07	MS;KI
1165	trans-Ocimenol		2.99		4.77	MS;KI
1168	cis-Ocimenol		4.69		6.79	MS;KI
1177	Terpinen-4-ol		0.6			MS;KI;RC
1184	$\alpha$ -Cyclogeraniol		1.49		2.27	MS;KI
1188	$\alpha$ -Terpineol		17.12		22.14	MS;KI;RC
1199	$\gamma$ -Terpineol		2.16		3.33	MS;KI
1229	Nerol		0.89	4.91	1.19	MS;KI;RC
1252	Geraniol	54.27	17.2	95.09	13.32	MS;KI;RC
1267	Geranial	2.15				MS;KI;RC
1381	Geranyl acetate	20.93	9.96			MS;KI;RC
1408	(Z)-Caryophyllene	5.92	3			MS;KI
1723	(2Z,6E)-Farnesol	3.61	0.68			MS;KI

**Table S6:** Analog of CMSS

Type	Constituent	% Area	Type	% Area
monoterpene	(E)- $\beta$ -Ocimene	3.54	aldehyde	2.15
monoterpenol	Linalool	6.16	ester	20.93
monoterpenol	Geraniol	54.27	monoterpene	3.54
aldehyde	Geranial	2.15	monoterpenol	60.43
ester	Geranyl acetate	20.93	sesquiterpene	5.92
sesquiterpene	(Z)-Caryophyllene	5.92	sesquiterpenol	3.61
sesquiterpenol	(2Z,6E)-Farnesol	3.61		

**Table S7** : Analog of CMAAC

Type	Constituent	% Area	Type	% Area
ester	Geranyl acetate	9.96	ester	9.96
monoterpene	beta-Myrcene	0.95	monoterpene	12.48
monoterpene	alpha-Terpinolene	0.83	monoterpenol	64.2
monoterpene	<i>o</i> -Cymene	0.54	other oxide	8.34
monoterpene	D-Limonene	2.14	sesquiterpene	3
monoterpene	(E)-beta-Ocimene	1.6	sesquiterpenol	0.68
monoterpene	(E)- $\beta$ -Ocimene	3.25		
monoterpene	Terpinolene	3.17		
monoterpenol	Linalool	13.5		
monoterpenol	Myrcenol	1.56		
monoterpenol	1-Terpineol	0.7		
monoterpenol	cis- $\beta$ -Terpineol	1.3		
monoterpenol	trans-Ocimenol	2.99		
monoterpenol	cis-Ocimenol	4.69		
monoterpenol	Terpinen-4-ol	0.6		
monoterpenol	alpha-Cyclogeraniol	1.49		
monoterpenol	$\alpha$ -Terpineol	17.12		
monoterpenol	gamma-Terpineol	2.16		
monoterpenol	Nerol	0.89		
monoterpenol	Geraniol	17.2		
other oxide	Geranic oxide	5.15		
other oxide	1,4-Cineole	0.67		
other oxide	1,8-Cineole	0.88		
other oxide	Ocimen quintoxide	1.64		
sesquiterpene	(Z)-Caryophyllene	3		
sesquiterpenol	(2Z,6E)-Farnesol	0.68		

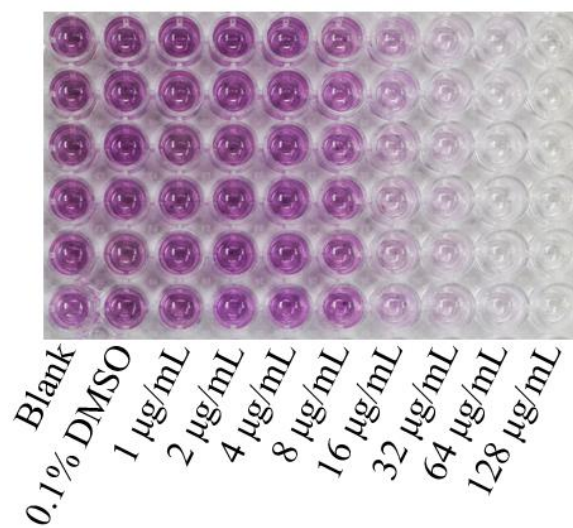
**Table S8:** Analog of GolAC

Type	Constituent	% Area	Type	% Area
other oxide	Geranic oxide	6.36	monoterpene	14.28
monoterpene	beta-Myrcene	1.35	monoterpenol	73.73
monoterpene	alpha-Terpinolene	1.2	other oxide	11.95
monoterpene	D-Limonene	3.38		
monoterpene	(E)-beta-Ocimene	2.05		
monoterpene	gamma-Terpinene	0.76		
monoterpene	Terpinolene	5.54		
monoterpenol	Linalool	14.16		
monoterpenol	Myrcenol	2.47		
monoterpenol	1-Terpineol	1.22		
monoterpenol	cis- $\beta$ -Terpineol	2.07		
monoterpenol	trans-Ocimenol	4.77		
monoterpenol	cis-Ocimenol	6.79		
monoterpenol	alpha-Cyclogeraniol	2.27		
monoterpenol	$\alpha$ -Terpineol	22.14		
monoterpenol	gamma-Terpineol	3.33		
monoterpenol	Nerol	1.19		
monoterpenol	Geraniol	13.32		
other oxide	1,4-Cineole	1.17		
other oxide	1,8-Cineole	1.41		
other oxide	Ocimen quintoxide	3.01		



**Table S9:** Cell viability of B16-F10 exposes to different concentration of CFSS for 24h(n=3)

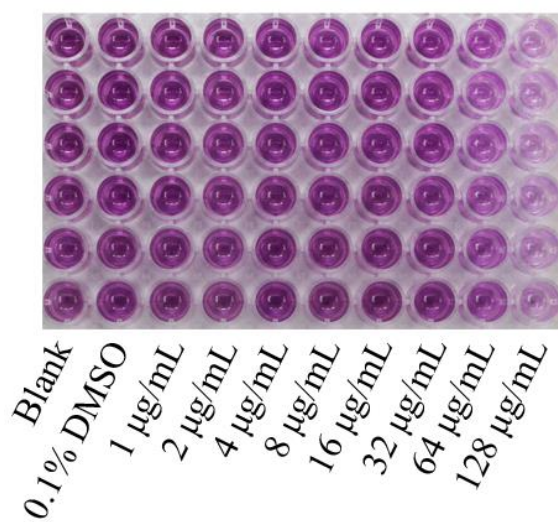
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	0.955	0.991	1.025	0.99	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	0.981	0.996	0.861	0.946	0.04
2µg/mL	0.994	0.942	0.989	0.975	0.02
4µg/mL	0.932	0.978	0.988	0.966	0.02
8µg/mL	0.788	0.831	0.776	0.798	0.02
16µg/mL	0.372	0.378	0.423	0.391	0.02
32µg/mL	0.187	0.152	0.235	0.191	0.02
64µg/mL	0.132	0.121	0.076	0.11	0.02
128µg/mL	0.016	0.064	0.022	0.034	0.02



**Figure S7:** MTT photo of CFSS

**Table S10:** Cell viability of B16-F10 exposes to different concentration of CFAC for 24h(n=3)

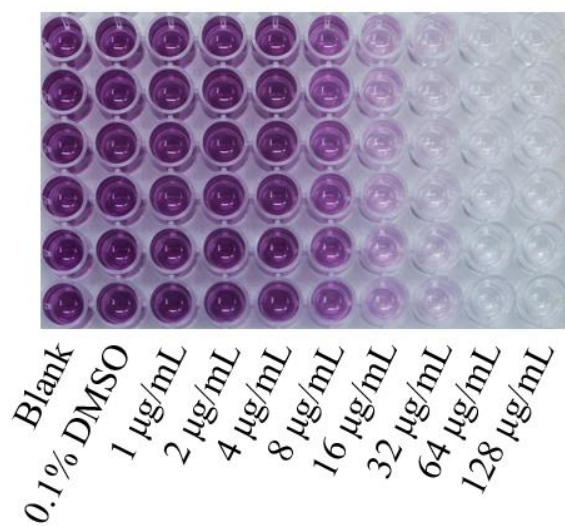
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	0.998	1.027	0.933	0.986	0.03
1%DMSO	1	1	1	1	0.02
1µg/mL	0.951	0.942	1.041	0.978	0.03
2µg/mL	1.052	0.972	0.959	0.994	0.03
4µg/mL	1.036	0.953	1.026	1.005	0.03
8µg/mL	0.937	0.932	1.032	0.967	0.03
16µg/mL	0.942	0.944	1.044	0.977	0.02
32µg/mL	0.891	0.947	0.962	0.933	0.02
64µg/mL	0.706	0.654	0.692	0.684	0.02
128µg/mL	0.352	0.361	0.418	0.377	0.02



**Figure S8:** MTT photo of CFAC

**Table S11:** Cell viability of B16-F10 exposes to different concentration of CalSS for 24h(n=3)

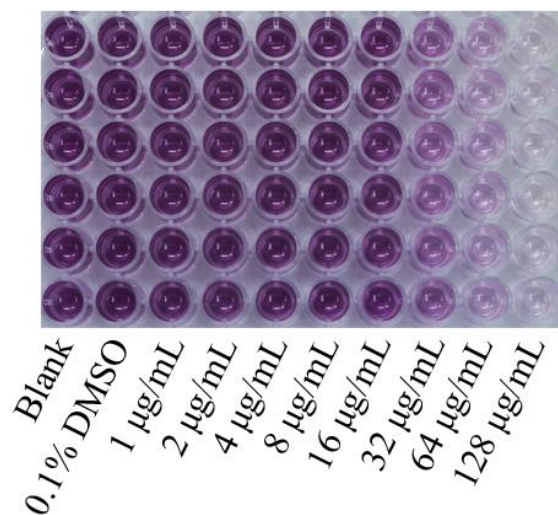
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	1.09	0.983	0.992	1.022	0.03
1%DMSO	1	1	1	1	0.02
1µg/mL	0.992	0.951	0.912	0.952	0.02
2µg/mL	0.981	0.943	0.921	0.948	0.02
4µg/mL	0.931	0.876	0.905	0.904	0.02
8µg/mL	0.641	0.585	0.571	0.599	0.02
16µg/mL	0.283	0.24	0.218	0.247	0.02
32µg/mL	0.162	0.09	0.095	0.116	0.02
64µg/mL	0.067	0.021	0.011	0.033	0.02
128µg/mL	0.058	0.011	0.012	0.027	0.02



**Figure S9:** MTT photop of CalSS

**Table S12:** Cell viability of B16-F10 exposes to different concentration of CalAC for 24h(n=3)

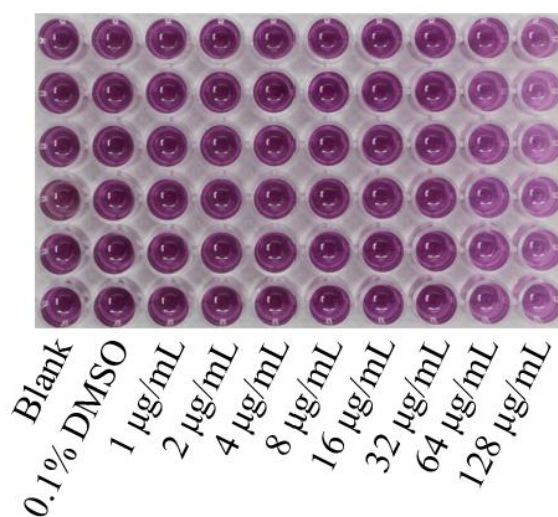
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	1.002	1.073	0.982	1.019	0.03
1%DMSO	1	1	1	1	0.02
1µg/mL	0.951	1.008	0.954	0.971	0.02
2µg/mL	0.922	0.931	0.858	0.904	0.02
4µg/mL	0.921	0.936	0.873	0.91	0.02
8µg/mL	0.921	0.928	0.852	0.9	0.02
16µg/mL	0.915	0.918	0.843	0.892	0.02
32µg/mL	0.601	0.551	0.541	0.564	0.02
64µg/mL	0.326	0.281	0.279	0.295	0.02
128µg/mL	0.159	0.115	0.108	0.127	0.02



**Figure S10:** MTT photop of CalAC

**Table S13:** Cell viability of B16-F10 exposes to different concentration of CMSS for 24h(n=3)

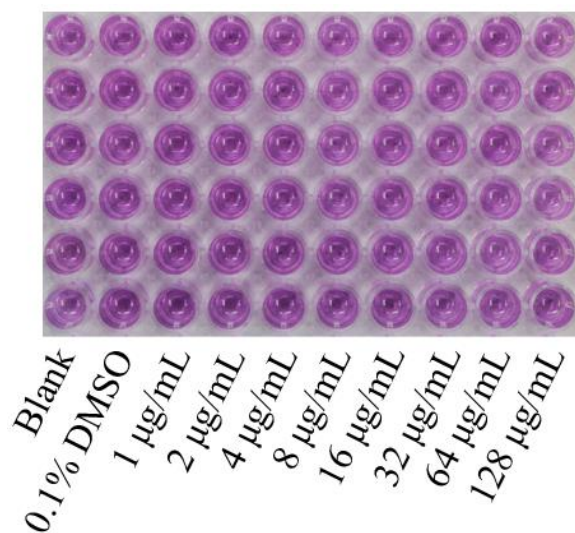
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	1.029	0.986	0.981	0.999	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	0.998	1.03	0.976	1.001	0.02
2µg/mL	1	1.032	0.978	1.003	0.02
4µg/mL	0.991	1.021	0.964	0.992	0.02
8µg/mL	0.989	0.992	1.068	1.016	0.03
16µg/mL	0.985	1.024	0.973	0.994	0.02
32µg/mL	0.956	0.915	0.894	0.922	0.02
64µg/mL	0.742	0.715	0.681	0.713	0.02
128µg/mL	0.561	0.621	0.541	0.574	0.02



**Figure S11:** MTT photop of CMSS

**Table S14:** Cell viability of B16-F10 exposes to different concentration of CMAC for 24h(n=3)

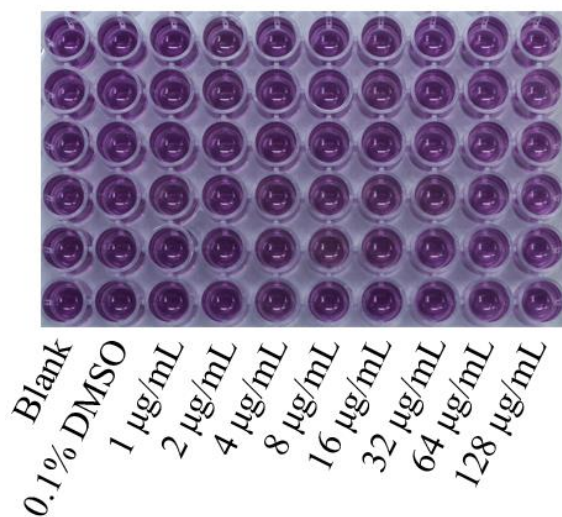
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	1.043	0.984	0.99	1.006	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	1.031	0.989	1.109	1.043	0.04
2µg/mL	1.032	0.992	0.981	1.002	0.02
4µg/mL	1.021	0.968	0.962	0.984	0.02
8µg/mL	1.008	0.959	0.948	0.972	0.02
16µg/mL	0.973	0.931	0.923	0.942	0.02
32µg/mL	0.967	0.917	0.885	0.923	0.02
64µg/mL	0.954	0.887	0.876	0.906	0.02
128µg/mL	0.942	0.889	0.868	0.9	0.02



**Figure S12:** MTT photop of CMAC

**Table S15:** Cell viability of B16-F10 exposes to different concentration of GolSS for 24h(n=3)

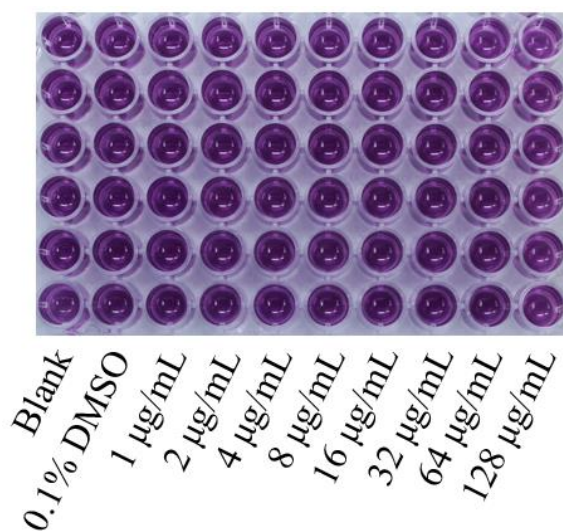
Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	0.992	1.082	0.994	1.023	0.03
1%DMSO	1	1	1	1	0.03
1µg/mL	0.973	0.981	1.029	0.994	0.02
2µg/mL	0.974	0.984	1.025	0.994	0.02
4µg/mL	0.942	0.929	1.021	0.964	0.03
8µg/mL	0.922	0.921	0.972	0.938	0.02
16µg/mL	0.998	0.92	0.932	0.95	0.02
32µg/mL	0.884	0.881	0.971	0.912	0.03
64µg/mL	0.942	0.843	0.821	0.869	0.04
128µg/mL	0.871	0.831	0.821	0.841	0.02



**Figure S13:** MTT photop of GolSS

**Table S16:** Cell viability of B16-F10 exposes to different concentration of GolAC for 24h(n=3)

Concentration	Cell viability (100%)			Mean	SE
	1	2	3		
Blank	1.068	0.993	0.973	1.011	0.03
1%DMSO	1	1	1	1	0.03
1µg/mL	0.989	0.987	1.055	1.01	0.02
2µg/mL	0.984	0.981	0.932	0.966	0.02
4µg/mL	0.972	1.048	0.958	0.993	0.03
8µg/mL	0.968	1.021	0.942	0.977	0.02
16µg/mL	0.972	0.944	1.021	0.979	0.02
32µg/mL	0.97	0.956	1.052	0.993	0.03
64µg/mL	0.941	0.921	1.052	0.971	0.04
128µg/mL	0.894	0.882	0.932	0.903	0.02

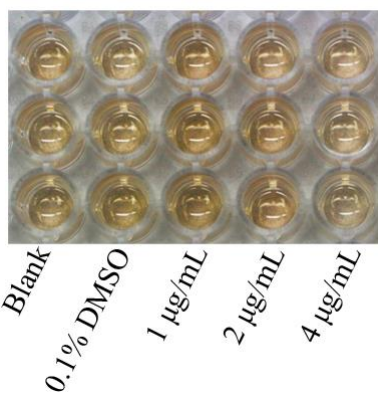


**Figure S14:** MTT photop of GolAC



**Table S17:** Melanin content of B16-F10 exposes to different concentration of CFSS for 24h(n=3)

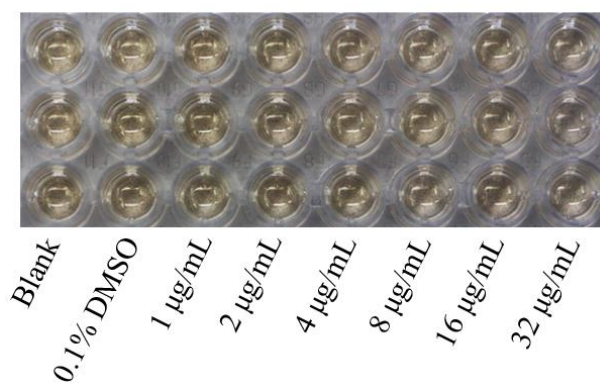
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.046	0.976	0.952	0.991	0.03
1%DMSO	1	1	1	1	0.02
1µg/mL	1.096	0.973	0.992	1.02	0.04
2µg/mL	0.946	0.996	0.956	0.966	0.02
4µg/mL	0.831	0.798	0.774	0.801	0.02
8µg/mL	0.627	0.631	0.548	0.602	0.03



**Figure S15:** Melanin photo of CFSS

**Table S18:** Melanin content of B16-F10 exposes to different concentration of CFAC for 24h(n=3)

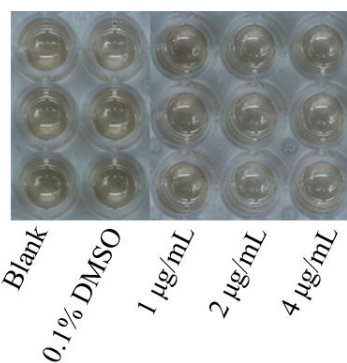
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.022	1.011	0.969	1.001	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	1.052	1.021	0.962	1.012	0.03
2µg/mL	0.873	0.941	0.886	0.9	0.02
4µg/mL	0.873	0.938	0.891	0.901	0.02
8µg/mL	0.862	0.792	0.813	0.822	0.02
16µg/mL	0.762	0.821	0.751	0.778	0.02
32µg/mL	0.632	0.613	0.542	0.596	0.03



**Figure S16:** Melanin photo of CFAC

**Table S19:** Melanin content of B16-F10 exposes to different concentration of CalSS for 24h(n=3)

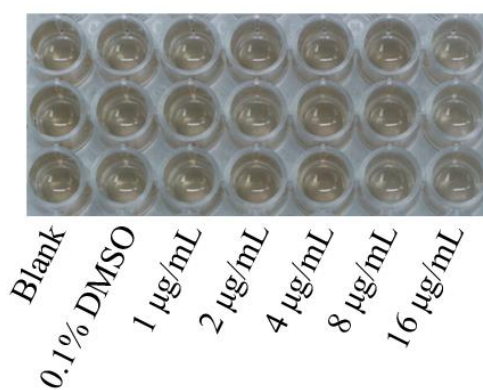
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.029	1.052	0.954	1.012	0.03
1%DMSO	1	1	1	1	0.03
1µg/mL	1.28	1.052	0.961	1.014	0.03
2µg/mL	0.758	0.721	0.841	0.773	0.04
4µg/mL	0.798	0.752	0.851	0.8	0.03
8µg/mL	0.532	0.646	0.562	0.58	0.03



**Figure S17:** Melanin photo of CalSS

**Table S20:** Melanin content of B16-F10 exposes to different concentration of CalAC for 24h(n=3)

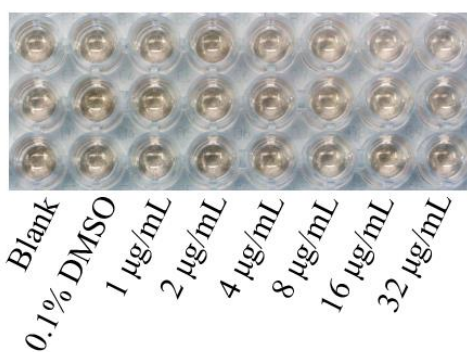
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.072	0.992	0.983	1.016	0.03
1%DMSO	1	1	1	1	0.02
1µg/mL	1.039	0.978	0.979	0.999	0.02
2µg/mL	1.028	0.971	0.974	0.991	0.02
4µg/mL	1.13	0.979	1.021	1.043	0.04
8µg/mL	0.968	0.883	0.852	0.901	0.03
16µg/mL	0.861	0.789	0.797	0.816	0.02
32µg/mL	0.691	0.622	0.612	0.642	0.02



**Figure S18:** Melanin photo of CalAC

**Table S21:** Melanin content of B16-F10 exposes to different concentration of CMSS for 24h(n=3)

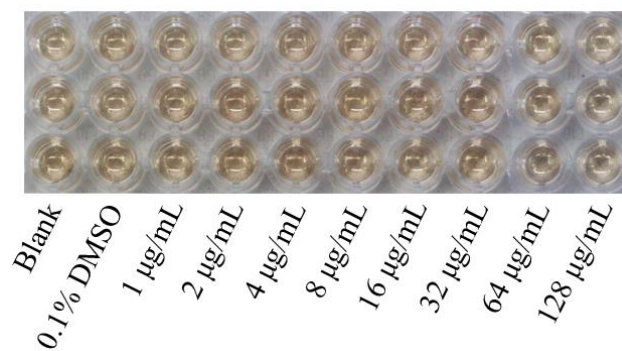
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.026	1.031	0.954	1.004	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	0.982	0.992	0.932	0.969	0.02
2µg/mL	0.978	0.971	0.889	0.946	0.03
4µg/mL	0.983	0.981	0.904	0.956	0.03
8µg/mL	0.892	0.821	0.873	0.862	0.02
16µg/mL	0.813	0.798	0.851	0.821	0.02
32µg/mL	0.732	0.764	0.692	0.729	0.02



**Figure S19:** Melanin photo of CMSS

**Table S22:** Melanin content of B16-F10 exposes to different concentration of CMAC for 24h(n=3)

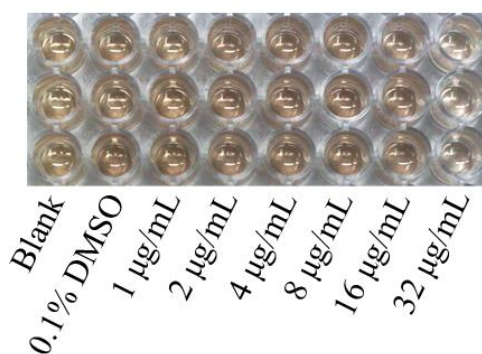
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.024	0.991	0.965	0.993	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	0.986	1.052	0.973	1.004	0.02
2µg/mL	1.019	0.998	0.964	0.994	0.02
4µg/mL	1.032	1.028	0.954	1.005	0.03
8µg/mL	0.984	1.019	0.962	0.988	0.02
16µg/mL	0.926	0.94	0.886	0.917	0.02
32µg/mL	0.891	0.882	0.821	0.865	0.02
64µg/mL	0.821	0.813	0.762	0.799	0.02
128µg/mL	0.771	0.775	0.712	0.753	0.02



**Figure S20:** Melanin photo of CMAC

**Table S23:** Melanin content of B16-F10 exposes to different concentration of GolSS for 24h(n=3)

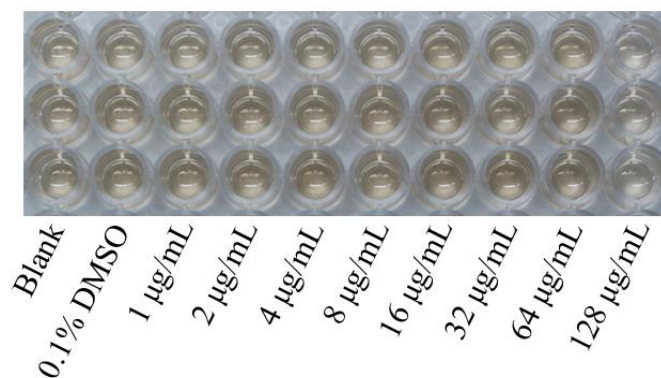
Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	1.031	0.985	0.981	0.999	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	1.032	0.979	0.983	0.998	0.02
2µg/mL	1.087	0.976	0.992	1.018	0.03
4µg/mL	1.082	0.981	0.984	1.016	0.03
8µg/mL	1.064	0.982	0.979	1.008	0.03
16µg/mL	1.011	0.914	0.923	0.949	0.03
32µg/mL	0.902	0.821	0.832	0.852	0.03



**Figure S21:** Melanin photo of GolSS

**Table S24:** Melanin content of B16-F10 exposes to different concentration of GolAC for 24h(n=3)

Concentration	Melanin content (100%)			Mean	SE
	1	2	3		
Blank	0.982	1.013	0.942	0.979	0.02
1%DMSO	1	1	1	1	0.02
1µg/mL	1.099	0.973	0.978	1.017	0.04
2µg/mL	1.072	0.978	0.969	1.006	0.03
4µg/mL	1.023	0.971	0.968	0.987	0.02
8µg/mL	1.043	0.992	0.965	1	0.02
16µg/mL	1.008	1.112	0.981	1.034	0.04
32µg/mL	0.992	1.071	0.973	1.012	0.03
64µg/mL	0.993	1.121	0.983	1.032	0.04
128µg/mL	0.862	0.803	0.812	0.826	0.02

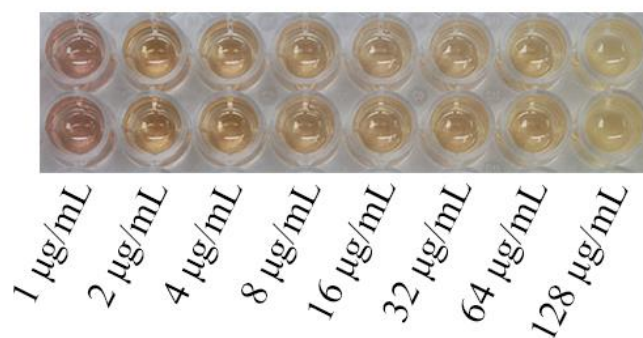


**Figure S22:** Melanin photo of GolAC



**Table S25:** Scavenging DPPH free radicals exposes to different concentration of CFSS (n=3)

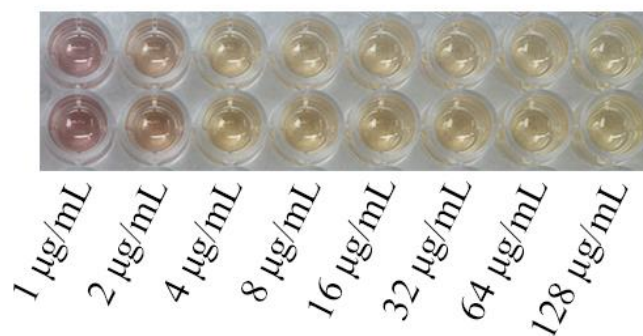
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
1µg/mL	34.568	34.556	34.548	34.557	0.006
2µg/mL	72.281	72.274	72.271	72.275	0.003
4µg/mL	82.14	82.141	82.152	82.144	0.004
8µg/mL	84.218	84.214	84.207	84.213	0.003
16µg/mL	85.216	85.232	85.221	85.223	0.005
32µg/mL	86.329	86.323	86.319	86.324	0.003
64µg/mL	92.225	92.218	92.228	92.224	0.003



**Figure S23:** DPPH photo of CFSS

**Table S26:** Scavenging DPPH free radicals exposes to different concentration of CFAC (n=3)

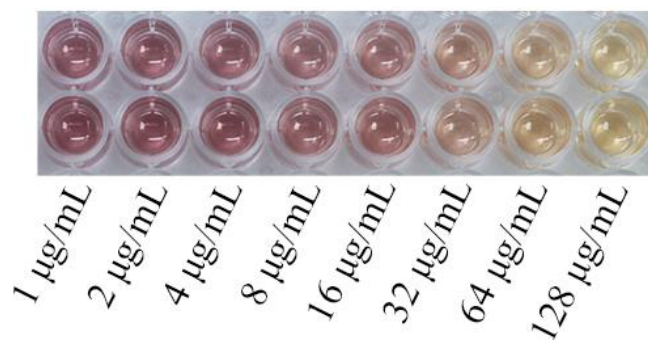
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
1µg/mL	32.014	32.022	32.023	32.02	0.003
2µg/mL	55.038	55.042	55.035	55.038	0.002
4µg/mL	81.223	81.217	81.226	81.222	0.003
8µg/mL	82.128	82.141	82.123	82.131	0.005
16µg/mL	84.132	84.125	84.13	84.129	0.002
32µg/mL	85.206	85.214	85.219	85.213	0.004
64µg/mL	92.135	92.143	92.148	92.142	0.004
128µg/mL	98.218	98.229	98.225	98.224	0.003



**Figure S24:** DPPH photo of CFAC

**Table S27:** Scavenging DPPH free radicals exposes to different concentration of CMSS (n=3)

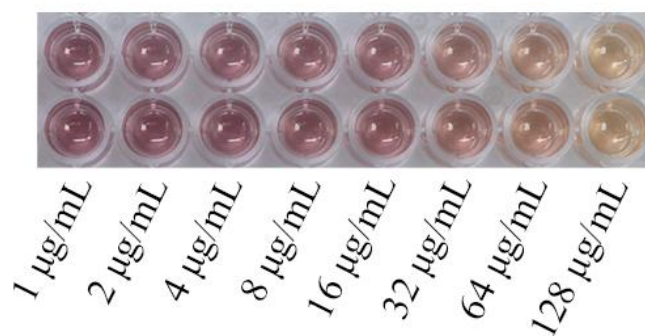
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
8 $\mu$ g/mL	9.799	9.815	9.816	9.81	0.006
16 $\mu$ g/mL	15.358	15.362	15.367	15.632	0.003
32 $\mu$ g/mL	42.248	42.235	42.238	42.24	0.004
64 $\mu$ g/mL	59.147	59.147	59.138	59.144	0.003
128 $\mu$ g/mL	68.266	68.276	68.262	68.268	0.004



**Figure S25:** DPPH photo of CMSS

**Table S28:** Scavenging DPPH free radicals exposes to different concentration of CMAC (n=3)

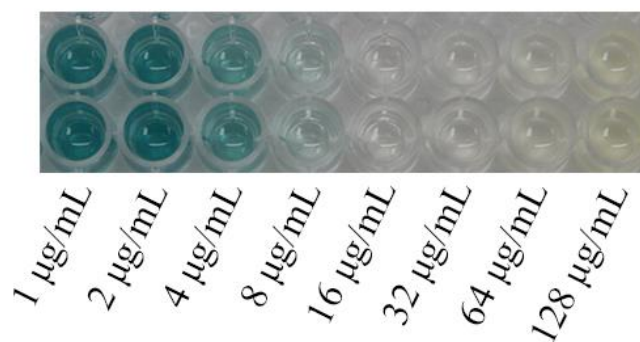
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
8 $\mu$ g/mL	8.921	8.915	8.924	8.92	0.003
16 $\mu$ g/mL	10.203	10.213	10.216	10.211	0.004
32 $\mu$ g/mL	30.726	30.714	30.721	30.72	0.003
64 $\mu$ g/mL	51.229	51.214	51.223	51.222	0.004
128 $\mu$ g/mL	58.431	58.417	58.419	58.422	0.004



**Figure S26:** DPPH photo of CMAC

**Table S29:** Scavenging ABTS free radicals exposes to different concentration of CFSS (n=3)

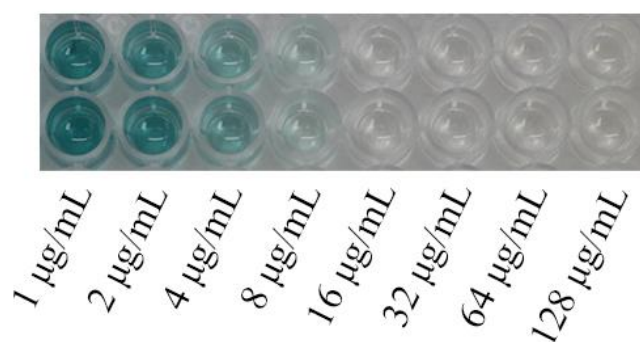
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
1µg/mL	3.846	3.836	3.844	3.842	0.003
2µg/mL	22.138	22.129	22.132	22.133	0.003
4µg/mL	56.172	56.181	56.168	56.174	0.004
8µg/mL	84.235	84.232	84.228	84.232	0.002
16µg/mL	96.455	96.458	96.447	96.453	0.003



**Figure S27:** ABTS photo of CFSS

**Table S30:** Scavenging ABTS free radicals exposes to different concentration of CFAC (n=3)

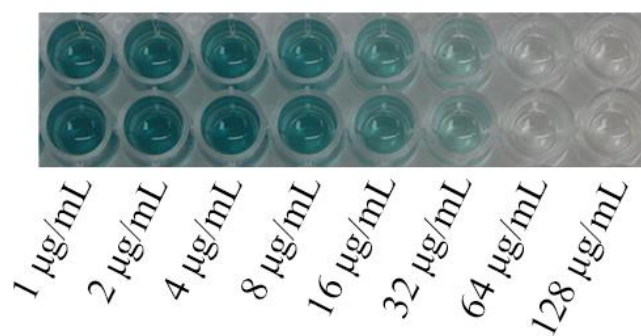
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
1 $\mu$ g/mL	3.229	3.216	3.224	3.223	0.004
2 $\mu$ g/mL	20.488	20.472	20.481	20.48	0.005
4 $\mu$ g/mL	57.604	57.598	57.599	57.6	0.002
8 $\mu$ g/mL	85.52	85.512	85.511	85.514	0.003
16 $\mu$ g/mL	97.135	97.127	97.138	97.133	0.003
32 $\mu$ g/mL	98.262	98.268	98.261	98.264	0.002



**Figure S28:** ABTS photo of CFAC

**Table S31:** Scavenging ABTS free radicals exposes to different concentration of CMSS (n=3)

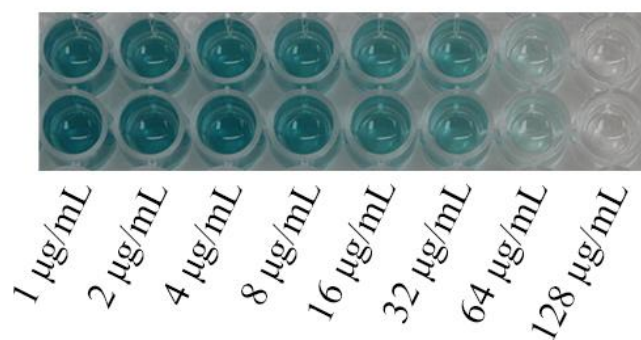
Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
4 $\mu$ g/mL	8.966	8.962	8.959	8.962	0.002
8 $\mu$ g/mL	33.279	33.286	33.275	33.280	0.003
16 $\mu$ g/mL	69.124	69.125	69.118	69.122	0.002
32 $\mu$ g/mL	81.225	81.216	81.218	81.220	0.003



**Figure S29:** ABTS photo of CMSS

**Table S32:** Scavenging ABTS free radicals exposes to different concentration of CMAC (n=3)

Concentration	% Free Radical scavenging rate			Mean	SE
	1	2	3		
4 $\mu$ g/mL	6.553	6.548	6.542	6.548	0.003
8 $\mu$ g/mL	30.431	30.419	30.417	30.422	0.004
16 $\mu$ g/mL	65.316	65.312	65.307	65.312	0.003
32 $\mu$ g/mL	71.112	71.118	71.108	71.113	0.003
64 $\mu$ g/mL	81.317	81.324	81.313	81.318	0.003
128 $\mu$ g/mL	98.211	98.208	98.214	98.211	0.002



**Figure S30:** ABTS photo of CMAC