Supplementary Information

Modified PAMAM dendrimers as matrix for photostabilization of curcumin

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Table S1. List of chemicals used in this study.

Chemicals	Manufacturer
Ethylenediamine	Sigma-Aldrich
Methyl acrylate	Sigma-Aldrich
Fluorescein	Sigma-Aldrich
Curcumin	Sigma-Aldrich
Triethylamine	Sigma-Aldrich
Cyanuric chloride	Sigma-Aldrich
2,4-dihydroxybenzophenone	Sigma-Aldrich
Hydrochloric acid	Sigma-Aldrich
Sodium hydroxide	Sigma-Aldrich
1,4-Dioxane	Sigma-Aldrich
Acetone	Sigma-Aldrich
Ethanol	Sigma-Aldrich
Methanol	Sigma-Aldrich
N,N-dimethylformamide	Sigma-Aldrich
2,4-dihydroxybenzophenone	Sigma-Aldrich

Table S2. detailed information of instruments applied for characterization of CU-1, CU-2, CU-3, CU-4, CU-5 and CU-6.

Characterization	Instrument
UV-Vis properties	UV–Vis Cecil9200 double beam spectrophotometer
Functional groups	Perkin Elmer Spectrum One (FTIR)
Different protons	Bruker DRX AVANCE spectrometer at 500 MHz (^{1}HNMR)
Different carbons	Bruker DRX AVANCE spectrometer at 500 MHz (^{13}CNMR)
C H N (%)	Heraeus Elemental Analyzer CHN-O-Rapid (Elementar-Analysensysteme, GmbH)
Melting point	Perkin Elmer Pyris 6 Differential Scanning Calorimeter (DSC)
Quantum yeild	Osean Optics Usb2000flg fluorometer
pH	Metrohm 691 digital pH meter

Table S3. synthesis condition of CU-1, CU-2, CU-3, CU-4, CU-5 and CU-6 in detail.

Compound	First material	Amount (mmol)	M-OH (cm^3)	MA (mmol)	EDA (mol)	t(h)	T (°C)	THF (cm^3)	CC (mmol)	Cur (mmol)	DHB (mmol)
P-G-0.5	EDA	16.6	50	68	-	168	25	-	-	-	-
P-G0	G-0.5	12.5	50	-	1.48	168	25	-	-	-	-
P-G0.5	G0	1.27	20	11.6	-	96	25	-	-	-	-
						24	45				
P-G1	G0.5	11.75	100	-	4.51	144	25	-	-	-	-
P-G1.5	G1	1.35	20	43.5	-	96	25	-	-	-	-
						24	45				
P-G2	G1.5	1.35	50	-	1.2	144	25	-	-	-	-
CU-1	G0	2.7	-	-	-	3	5	50	10.8	-	-
						24	35	50	-	10.8	-
						24	75	50	-	10.8	-
CU-2	G1	2.7	-	-	-	3	5	50	10.8	-	-
						24	35	50	-	10.8	-
						24	75	50	-	10.8	-
CU-3	G2	2.7	-	-	-	3	5	50	10.8	-	-
						24	35	50	-	10.8	-
						24	75	50	-	10.8	-
CU-4	G0	2.7	-	-	-	3	5	50	10.8	-	-
						24	35	50	-	10.8	-
						24	75	50	-	-	10.8
CU-5	G1	2.7	-	-	-	3	5	50	10.8	-	-
						24	35	50	-	10.8	-
						24	75	50	-	-	10.8
CU-6	G2	2.7	-	-	-	3	5	50	10.8	-	-
						24	35	50	-	10.8	-
						24	75	50	-	-	10.8

*EDA: Ethylenediamine, M-OH: Methanol, MA: Methyl acrylate**,** THF:Tetrahydrofuran**,** CC:Cyanuric chloride, Cur: Curcumin, DHB: 2,4-dihydroxyBenzophenone

Table S4. Analysis data of synthesized compounds CU-1, CU-2, CU-3, CU-4, CU-5 and CU-6.

Compounds	**CU-1**	**CU-2**	**CU-3**
FTIR (KBr) cm^{-1}	3403 (N-H str. secondary amine), 3230 (N-H str. amide), 3075 (C-H aromatic), 2921 (C-H str. aliphatic), 1644 (C=O str. carbonyl group amide), 1598 (C=O str. ketone), 1575 (amide I), 1528 (amide II), 1513, 1451 (C=C str. Aromatic), 1271 (C-N str.).	3419 (N-H str. secondary amine), 3210 (N-H str. amide), 3075 (C-H aromatic), 2930 (C-H str. aliphatic), 1685 (C=O str. carbonyl group amide), 1601 (C=O str. ketone), 1578 (amide I), 1527 (amide II), 1510, 1451 (C=C str. aromatic), 1268 (C-N str.).	3426 (N-H str. secondary amine), 3180 (N-H str. amide), 3073 (C-H aromatic), 2927 (C-H str. aliphatic), 1690 (C=O str. carbonyl group amide), 1627 (C=O str. ketone), 1587 (amide I), 1527 (amide II), 1510, 1458 (C=C str. aromatic), 1274 (C-N str.).
^{1}HNMR (DMSO-d_6,500MHz, ppm)	7.32-7.65 (48H, aromatic), 3.05 (4H, CONH), 3.82 (48H, OCH_3), 6.07 (16H, CH=C<u>H</u>), 6.87 (16H, Ph-C<u>H</u>=CH), 6.74 (16H, $COCH_2CO$), 9.76 (8H, Ph-OH), 4.20 (4H, NCH_2CH_2N), 2.88 (16H, NCH_2CH_2), 3.74 (16H, C<u>H</u>$_2$NH), 3.12 (4H, CH_2N<u>H</u>).	7.14-7.56 (96H, aromatic), 2.88 (12H, CONH), 3.84 (96H, OCH_3), 6.07 (32H, CH=C<u>H</u>), 6.85 (32H, Ph-C<u>H</u>=CH), 6.77 (32H, $COCH_2CO$), 9.73 (16H, Ph-OH), 4.10 (4H, NCH_2CH_2N), 2.62 (48H, NCH_2CH_2), 3.39 (48H, C<u>H</u>$_2$NH), 3.05 (8H, CH_2N<u>H</u>).	7.14-7.54 (192H, aromatic), 2.99 (28H, CONH), 3.88 (192H, OCH_3), 6.06 (64H, CH=C<u>H</u>), 6.87 (64H, Ph-C<u>H</u>=CH), 6.78 (64H, $COCH_2CO$), 9.75 (32H, Ph-OH), 4.26 (4H, NCH_2CH_2N), 2.62 (112H, NCH_2CH_2), 3.57 (112H, C<u>H</u>$_2$NH), 3.08 (16H, CH_2N<u>H</u>).
^{13}CNMR (DMSO-D6,500MHz ppm)	182.6, 177.5, 149.3, 148.8, 147.4, 140.1, 122.3, 120.5, 115.1, 111.2, 55.1, 54.3, 46.8, 41.1, 35.9, 27.2, 18.5.	182.6, 177.5, 149.3, 148.8, 147.4, 140.1, 122.5, 120.5, 115.1, 110.7, 55.1, 54.6, 44.8, 42.3, 35.2, 27.5, 18.9**.**	182.6, 178.3, 149.3, 148.8, 147.4, 140.1, 122.5, 120.5, 115.4, 110.8, 55.1, 54.1, 44.8, 42.1, 39.5, 24.5, 18.9
Elemental analysis	$C_{202}H_{196}N_{22}O_{52}$ (MW 3764.05) calculated: C 64.46, H 5.25, N 8.19%; found: C 64.40, H 5.18, N 8.19%.	$C_{422}H_{424}N_{50}O_{108}$(MW 7924.09) calculated: C 63.96, H 5.39, N 8.84%; found: C 63.80, H 5.28, N 8.73%.	$C_{862}H_{880}N_{106}O_{220}$(MW16244.66) calculated: C 63.73, H 5.46, N 9.14%; found: C 63.60, H 5.49, N 9.20%
Yield (%)	88	75	73
M.P. (°C)	249	273	287
$\boldsymbol{\varepsilon_{max}}$ (l $mol^{-1}cm^{-1}$)	165282	246143	370521
Compounds	**CU-4**	**CU-5**	**CU-6**
FTIR (KBr) cm^{-1}	3402: (N-H str. secondary amine), 3264 (N-H str. amide), 3052 (C-H aromatic), 2909 (C-H str. aliphatic), 1708 (C=O str. conj. ketone), 1651 (C=O str. carbonyl group amide), 1599 (C=O str. ketone), 1575 (amide I), 1528 (amide II), 1511, 1458 (C=C str. aromatic), 1278 (C-N str.).	3416 (N-H str. secondary amine), 3255 (N-H str. amide), 3070 (C-H aromatic), 2938 (C-H str. aliphatic), 1717 (C=O str. conj. ketone), 1630 (C=O str. carbonyl group amide), 1601 (C=O str. ketone), 1578 (amide I), 1527 (amide II), 1511, 1443 (C=C str. aromatic), 1273 (C-N str.).	3423 (N-H str. secondary amine), 3249 (N-H str. amide), 3065 (C-H aromatic), 2933 (C-H str. aliphatic), 1710 (C=O str. conj. ketone), 1630 (C=O str. carbonyl group amide), 1603 (C=O str. ketone), 1587 (amide I), 1527 (amide II), 1507, 1445 (C=C str. aromatic), 1277 (C-N str.).
^{1}HNMR (DMSO-d_6,500MHz, ppm)	7.35-7.62 (56H, aromatic), 3.05 (4H, CONH), 3.82 (24H, OCH_3), 6.40 (8H, CH=C<u>H</u>), 6.78 (8H, Ph-C<u>H</u>=CH), 6.64 (8H, $COCH_2CO$), 9.7 (4H, Ph-curcumin-OH), 10.33 (4H, Ph-benzophenone-OH), 4.14 (4H, NCH_2CH_2N), 2.88 (16H, NCH_2CH_2), 3.74 (16H, C<u>H</u>$_2$NH), 3.12 (4H, CH_2N<u>H</u>).	7.36-7.62 (112H, aromatic), 3.05 (12H, CONH), 3.79 (48H, OCH_3), 6.40 (16H, CH=C<u>H</u>), 6.74 (16H, Ph-C<u>H</u>=CH), 6.63 (16H, $COCH_2CO$), 9.86 (8H, Ph-curcumin-OH), 10.56 (8H, Ph-benzophenone-OH), 4.20 (4H, NCH_2CH_2N), 2.65 (48H, NCH_2CH_2), 3.70 (48H, C<u>H</u>$_2$NH), 3.10 (8H, CH_2N<u>H</u>).	7.32-7.62(224H, aromatic), 3.03 (28H, CONH), 3.78 (96H, OCH_3), 6.42 (32H, CH=C<u>H</u>), 6.84 (32H, Ph-C<u>H</u>=CH), 6.74 (32H, $COCH_2CO$), 9.88 (16H, Ph-curcumin-OH),10.48(16H, Ph-benzophenone-OH), 4.13 (4H, NCH_2CH_2N), 2.66 (112H, NCH_2CH_2), 3.57 (112H, C<u>H</u>$_2$NH), 3.07 (16H, CH_2N<u>H</u>).
^{13}CNMR (DMSO-D6,500MHz ppm)	198.1, 183.6, 177.2, 163.9, 149.3, 137.4, 134.7, 131.0, 128.1, 127.8, 111.9, 55.1, 53.9, 44.8, 42.4, 35.9, 27.8, 18.9	198.1, 188.2, 178.2, 164.2, 149.7, 137.5, 134.7, 130.99, 128.1, 127.8, 111.9, 55.8, 53.7, 44.8, 40.7, 35.2, 27.5, 18.9	198.2, 188.6, 178.9, 164.4, 149.4, 148.8, 147.4, 130.9, 128.1, 127.8, 111.9, 55.1, 52.6, 44.8, 40.6, 35,9, 24.5, 18.5
Elemental analysis	$C_{170}H_{156}N_{22}O_{40}$(MW:3147.15) calculated: C 64.88, H 4.99, N 9.79%; found: C 64.80, H 4.93, N 9.69%.	$C_{358}H_{344}N_{50}O_{84}$(MW:6691.11) calculated: C 64.26, H 5.18, N 10.46%; found C 64.20, H 5.19, N 10.42%.	$C_{734}H_{720}N_{106}O_{172}$(MW:13778.08) calculated: C 63.98, H 5.26, N 10.77%; found C 63.80, H 5.19, N 10.72%.
Yield (%)	73	70	70
M.P. (°C)	222	264	278
$\boldsymbol{\varepsilon_{max}}$ (l $mol^{-1}cm^{-1}$)	122857	188936	295412