Salt-induced hydrogelation of functionalised-dipeptides

Lin Chen,[a] Tom O. McDonald,[a] and Dave J. Adams*[,a]
[a] *Department of Chemistry, University of Liverpool, Crown Street, Liverpool, L69 7ZD, U.K.; E-mail: d.j.adams@liverpool.ac.uk*
[b] *Centre for Materials Discovery, University of Liverpool, Liverpool, L69 3BX, U.K.*

Supporting Information

Conjugates **1a-1r** and **10a-10c** have been reported previously.[1] Conjugates **3a-3c** have been reported previously.[2] Conjugate **5** was reported previously.[3] Conjugate **11a-c** are commercially available. L-amino acids were used throughout.

Conjugates **2a** and **2b** was prepared by the following procedure, Fig. S1.

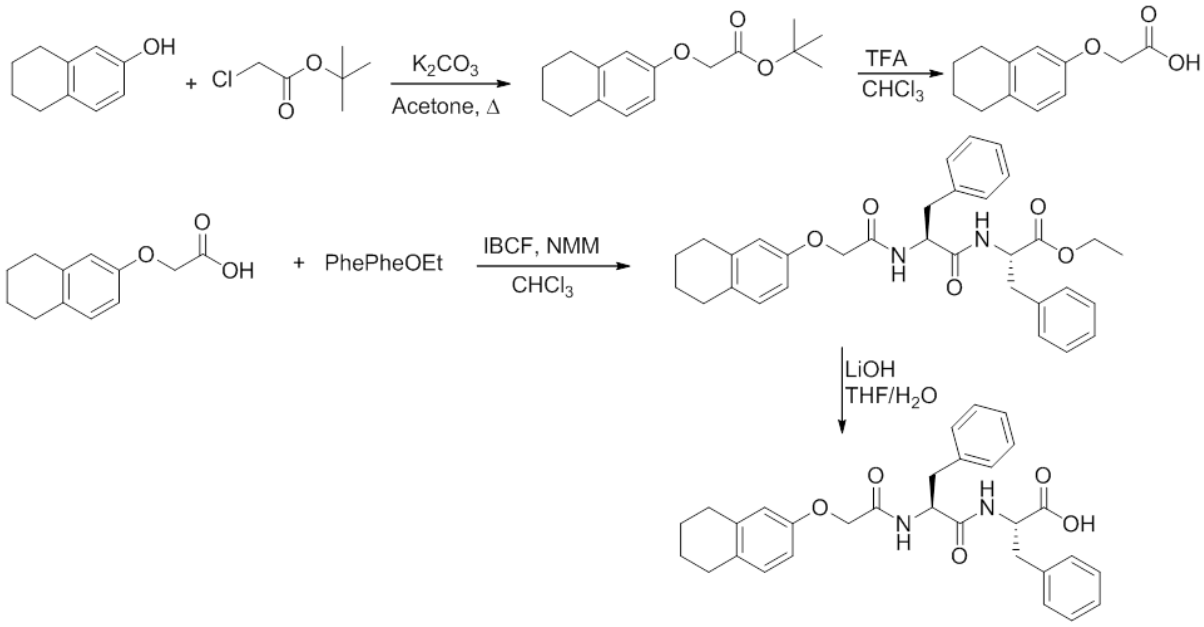

Fig. S1. Synthesis route to conjugate **2**.

Diphenylalanine ethyl ester was prepared as described elsewhere.[4] The synthetic strategy followed that reported elsewhere.[1]

***Tert*-butyl 2-(5,6,7,8-tetrahydronaphthalen-2-yloxy)acetate:** ^{1}H NMR ($CDCl_3$) 6.95 (d, ArH, 1H, J = 8.4 Hz), 6.65 (dd, ArH, 1H, J = 8.4 Hz, J = 2.8 Hz), 6.58 (d, ArH, 1H, J = 2.8 Hz), 4.46 (s, OCH_2, 2H), 2.70 (m, CH_2, 4H), 1.76 (m, CH_2, 4H), 1.49 (s, CH_3, 9H) ppm. ^{13}C NMR ($CDCl_3$), 168.3, 155.7, 138.5, 130.2, 130.0, 129.9, 129.3, 114.6, 112.8, 82.2, 65.8, 29.7, 29.5, 28.1, 23.4, 23.0 ppm. MS (ES) 285 ($[M+Na]^+$). Accurate mass calculated for $C_{16}H_{22}O_3Na$: 285.1467. Found: 285.1469.

2-(5,6,7,8-Tetrahydronaphthalen-2-yloxy)acetic acid: ^{1}H NMR (DMSO) 6.93 (d, ArH, 1H, *J* = 8.4 Hz), 6.61 (dd, ArH, 1H, , *J* = 8.4 Hz, *J* = 2.8 Hz), 6.55 (d, ArH, 1H, *J* = 2.8 Hz), 4.56 (s, OCH_2, 2H), 2.62 (m, CH_2, 4H), 1.67 (m, CH_2, 4H) ppm. ^{13}C NMR (DMSO) 170.4, 155.4, 137.6, 129.7, 129.1, 114.0, 112.1, 64.4, 28.9, 27.9, 22.9, 22.6 ppm. MS (ES) 224 ($[M+NH_4]^+$).

Ethyl 3-phenyl-2-(3-phenyl-2-(2-(5,6,7,8-tetrahydronaphthalen-2-yloxy)acetamido)propanamido)propanoate: ^{1}H NMR ($CDCl_3$) 7.20 (m, ArH and NH, 8H), 7.05 (d, ArH, 1H, *J* = 8.1 Hz), 6.96 (m, ArH, 2H), 6.60 (dd, ArH, 1H, *J* = 8.3 Hz, *J* = 2.4 Hz), 6.55 (d, ArH, 1H, *J* = 2.4 Hz), 6.28 (d, NH, 1H, *J* = 7.6 Hz), 4.71 (m, CHNH, 2H), 4.36 (s, OCH_2, 2H), 4.12 (m, CH_2CH_3, 2H), 3.03 (m, CH_2Ph, 4H), 2.71 (m, CH_2, 4H), 1.77 (m, CH_2, 4H), 1.21 (t, CH_3, 3H, *J* = 7.1 Hz) ppm. ^{13}C NMR ($CDCl_3$) 170.8, 169.8, 168.6, 154.9, 138.6, 136.1, 135.6, 130.9, 130.2, 129.4, 129.2, 128.7, 128.5, 127.1, 114.7, 112.2, 67.3, 61.5, 53.7, 53.4, 37.9, 37.8, 29.7, 28.6, 23.3, 23.0, 1401 ppm. MS (ES) 551 ($[M+Na]^+$). Accurate mass calculated for $C_{32}H_{36}N_2O_5Na$: 551.2522. Found: 551.2513.

3-Phenyl-2-(3-phenyl-2-(2-(5,6,7,8-tetrahydronaphthalen-2-yloxy)acetamido)propanamido)propanoic acid (Conjugate 2): ^{1}H NMR (DMSO) 8.41 (d, NH, 1H, *J* = 7.8 Hz), 7.93 (d, NH, 1H, *J* = 8.6 Hz), 7.17 (m, ArH, 10H), 6.90 (d, ArH, 1H, *J* = 8.2 Hz), 6.56 (m, ArH, 2H), 4.62 (m, CHNH, 1H), 4.46 (m, CHNH, 1H), 4.33 (s, OCH_2, 2H), 3.08 (dd, CHPh, 1H, *J* = 13.9 Hz, *J* = 5.2 Hz), 3.01 (dd, CHPh, 1H, *J* = 13.9 Hz, *J* = 5.2 Hz), 2.92 (dd, CHPh, 1H, *J* = 13.9 Hz, *J* = 8.8 Hz), 2.83 (dd, CHPh, 1H, *J* = 13.9 Hz, *J* = 8.8 Hz), 2.62 (m, CH_2, 4H), 1.68 (m, CH_2, 4H) ppm. ^{13}C NMR (DMSO) 172.7, 170.7, 167.4, 155.4, 137.6, 137.4, 137.3, 129.7, 129.2, 129.1, 128.2, 127.9, 126.4, 126.2, 114.4, 12.3, 66.7, 37.4, 36.7, 28.9, 27.9, 22.9, 22.6 ppm. MS (ES) 499 ($[M-H]^-$). Accurate mass calculated for $C_{30}H_{31}N_2O_5$: 499.2233. Found 499.2242.

Methyl 3-methyl-2-(2-((5,6,7,8-tetrahydronaphthalen-2-yl)oxy)acetamido)butanoate ^{1}H NMR ($CDCl_3$) 7.03 (bd, NH, 1H, J_{HH} = 8.7 Hz), 6.99 (d, ArH, 1H, J_{HH} = 5.4 Hz), 6.70 (dd, ArH, 1H, J_{HH} = 8.3 Hz, J_{HH} = 2.7 Hz), 6.64 (d, ArH, 1H, J_{HH} = 2.7 Hz), 4.62 (dd, CHNH, 1H, J_{HH} = 9.0 Hz, J_{HH} = 5.0 Hz), 4.51 (d, OCH, 1H, J_{HH} = 15.1 Hz), 4.46 (d, OCH, 1H, J_{HH} = 15.1 Hz), 3.71 (s, OCH_3, 3H), 2.71 (m, CH_2, 4H), 2.71 (m, $CH(CH_3)_2$, 1H), 1.77 (m, CH_2, 4H), 0.93 (d, CH=3, 3H, J_{HH} = 6.8 Hz), 0.89 (d, CH_3, 3H, J_{HH} = 6.8 Hz) ppm. ^{13}C NMR ($CDCl_3$) 171.9, 168.5, 155.1, 138.6, 130.9, 130.2, 114.9, 112.5, 67.6, 56.6, 52.2, 31.3, 30.9, 29.6, 28.6, 23.3, 23.0 18.9, 17.7 ppm. MS (ES) 342 ($[M+Na]^+$). Accurate mass calculated for $C_{18}H_{25}NO_4Na$: 342.1671. Found: 342.1687.

3-Methyl-2-(2-((5,6,7,8-tetrahydronaphthalen-2-yl)oxy)acetamido)butanoic acid ^{1}H NMR (DMSO) 7.99 (d, NH, 1H, *J* = 8.6 Hz), 6.93 (d, ArH, 1H, *J* = 8.4 Hz), 6.67 (dd, ArH, 1H, *J* = 8.3 Hz, *J* = 2.6 Hz), 6.62 (d, ArH, 1H, *J* = 2.6 Hz), 4.54 (d, OCH, 1H, *J* = 14.8 Hz), 4.49 (d, OCH, 1H, *J* = 14.8 Hz), 4.20 (dd, CHNH, 1H, *J* = 8.6 Hz, *J* = 5.7 Hz), 2.63 (m, CH_2, 4H), 2.11 (m, $CH(CH_3)_2$, 1H), 1.69 (m, CH_2, 4H), 0.87 (m, CH=3, 6H) ppm. ^{13}C NMR (DMSO) 172.7, 167.9, 155.5, 137.5, 129.7, 129.41, 114.1, 112.5, 66.4, 56.7, 29.9, 28.9, 27.9, 22.9,

22.6, 19.1, 17.9 ppm. MS (ES) 304 ([M-H]$^-$). Accurate mass calculated for $C_{17}H_{22}NO_4$: 304.1549. Found: 304.1559.

Ethyl 2-(3-methyl-2-(2-((5,6,7,8-tetrahydronaphthalen-2-yl)oxy)acetamido)butanamido)acetate ^{1}H NMR ($CDCl_3$) 7.11 (d, NH, 1H, *J* = 8.9 Hz), 6.98 (d, ArH, 1H, *J* = 8.4 Hz), 6.68 (dd, ArH, 1H, *J* = 8.3 Hz, *J* = 2.7 Hz), 6.65 (d, ArH, 1H, *J* = 2.7 Hz), 6.53 (m, NH, 1H), 4.52 (d, OCH, 1H, *J* = 15.1 Hz), 4.47 (d, OCH, 1H, *J* = 15.1 Hz), 4.36 (dd, CHNH, 1H, *J* = 8.9 Hz, *J* = 6.7 Hz), 4.20 (q, C*H*$_2$CH$_3$, 2H, *J* = 7.1 Hz), 4.04 (dd, CHNH, 1H, *J* = 18.2 Hz, *J* = 5.6 Hz), 3.88 (dd, CHNH, 1H, *J* = 18.2 Hz, *J* = 5.1 Hz), 2.70 (m, CH_2, 4H0, 2.19 (m, $CH(CH_3)_2$), 1H), 1.77 (m, CH_2, 4H), 1.27 (t, CH_3, 3H, *J* = 7.1 Hz), 0.97 (d, CH_3, 3H, *J* = 6.8 Hz), 0.91 (d, CH_3, 3H, *J* = 6.8 Hz) ppm. ^{13}C NMR ($CDCl_3$) 170.9, 168.5, 168.9, 154.9, 138.6, 130.9, 130.2, 114.8, 112.4, 67.4, 61.6, 57.9, 41.3, 30.8, 29.6, 28.6, 27.9, 23.3, 23.0, 19.2, 18.9, 18.6, 17.9, 14.1 ppm. MS (ES) 413 ([M+Na]$^+$). Accurate mass calculated for $C_{21}H_{30}N_2O_5Na$: 413.2052. Found: 413.2039.

2-(3-Methyl-2-(2-((5,6,7,8-tetrahydronaphthalen-2-yl)oxy)acetamido)butanamido)acetic acid ^{1}H NMR (DMSO) 8.42 (t, NH, 1H, J_{HH} = 5.8 Hz), 7.80 (d, NH, 1H, J_{HH} = 9.1 Hz), 6.95 (d, ArH, 1H, J_{HH} = 8.4 Hz), 6.67 (dd, ArH, 1H, J_{HH} = 8.3 Hz, J_{HH} = 2.7 Hz), 6.62 (d, ArH, 1H, J_{HH} = 2.7 Hz), 4.54 (d, OCH, 1H, J_{HH} = 14.8 Hz), 4.49 (d, OCH, 1H, J_{HH} = 14.8 Hz), 4.28 (dd, CHNH, 1H, J_{HH} = 9.1 Hz, J_{HH} = 6.4 Hz), 3.74 (m, CH_2NH, 2H), 2.64 (m, CH_2, 4H), 2.00 (m, $CH(CH_3)_2$, 1H), 1.69 (m, CH_2, 4H), 0.87 (d, CH_3, 3H, J_{HH} = 6.8 Hz), 0.82 (d, CH_3, 3H, J_{HH} = 6.8 Hz) ppm. ^{13}C NMR (DMSO) 171.0, 167.6, 155.5, 155.4, 137.6, 137.5, 129.7,. 129.6, 129.2, 129.1, 114.2, 112.5, 66.6, 56.9, 30.8, 28.9, 27.9, 22.9, 22.6, 19.1, 17.8 ppm. MS(ES) 361 ([M-H]$^-$). Accurate mass calculated for $C_{19}H_{25}N_2O_5$: 361.1763. Found: 361.1778.

Conjugates **1s**, **4** and **5** were prepared using an analogous synthetic procedure to **2** from 6-methoxy-2-naphthol, 3-methoxy-2-naphthol and 7-methoxy-2-naphthol respectively.

***Tert*-butyl 2-(6-methoxynaphthalen-2-yloxy)acetate:** ^{1}H NMR ($CDCl_3$) 7.64 (d, ArH, 1H, J_{HH} = 8.9 Hz), 7.59 (d, ArH, 1H, J_{HH} = 8.8 Hz), 7.24 (s, ArH, 1H), 7.18 (dd, ArH, 1H, J_{HH} = 9.1 Hz, J_{HH} = 2.6 Hz), 7.09 (m, ArH, 2H), 4.58 (s, OCH_2, 2H), 3.88 (s, OCH_3, 3H), 1.49 (s, $C(CH_3)_3$, 9H) ppm. ^{13}C NMR ($CDCl_3$) 168.1, 156.5, 130.3, 129.6, 128.3, 128.2, 119.0, 118.9, 118.1, 107.9, 106.3, 82.2, 66.2, 55.3, 28.1 ppm. MS (CI) 306 ([M+NH_4]$^+$). Analysis calculated for $C_{17}H_{20}O_4$: C, 70.81 %; H, 6.99 %. Found C, 70.81 %; H, 6.97 %.

***Tert*-butyl 2-(3-methoxynaphthalen-2-yloxy)acetate:** ^{1}H NMR ($CDCl_3$) 7.68 (dd, ArH, 1H, J_{HH} = 6.9 Hz, J_{HH} = 2.2 Hz), 7.63 (dd, ArH, 1H, J_{HH} = 6.8 Hz, J_{HH} = 2.2 Hz), 7.33 (m, ArH, 2H), 7.14 (s, ArH, 1H), 7.02 (s, ArH, 1H), 4.69 (s, OCH_2, 2H), 4.00 (s, OCH_3, 3H), 1.48 (s, CH_3, 9H) ppm. ^{13}C NMR ($CDCl_3$) 167.6, 149.6, 147.8, 129.7, 128.8, 126.4, 126.3, 124.5, 124.2, 108.1, 1068, 82.4, 66.3, 55.9, 28.1 ppm. MS (ES) 311 ([M+Na]$^+$). Accurate mass calculated for $C_{17}H_{20}O_4Na$: 311.1259. Found: 311.1261.

***Tert*-butyl 2-(7-methoxynaphthalen-2-yloxy)acetate:** ^{1}H NMR ($CDCl_3$) 7.67 (d, ArH, 1H, J_{HH} = 6.7 Hz), 7.65 (d, ArH, 1H, J_{HH} = 7.5 Hz), 7.06 (dd, ArH, 1H, J_{HH} = 8.9 Hz, J_{HH} = 2.5

Hz), 7.00 (m, ArH, 3H), 4.61 (s, OCH_2, 2H0, 3.89 (s, OCH_3, 3H), 1.50 (s, CH_3, 9H) ppm. ^{13}C NMR ($CDCl_3$) 168.0, 158.3, 156.5, 135.7, 129.4, 129.2, 124.7, 116.4, 115.9, 106.6, 105.3, 52.4, 65.8, 55.3, 28.1 ppm. MS (ES) 311 ($[M+Na]^+$). Accurate mass calculated for $C_{17}H_{20}O_4Na$: 311.1259. Found: 311.1259.

2-(6-Methoxynaphthalen-2-yloxy)acetic acid: ^1H NMR (DMSO) 7.77 (d, ArH, 1H, J_{HH} = 8.9 Hz), 7.71 (d, ArH, 1H, J_{HH} = 9.1 Hz), 7.27 (d, ArH, 1H, J_{HH} = 2.6 Hz), 7.23 (d, ArH, 1H, J_{HH} = 2.4 Hz), 7.13 (dd, ArH, 1H, J_{HH} = 9.0Hz, J_{HH} = 2.4 Hz), 4.76 (s, OCH_2, 2H), 3.84 (s, OCH_3, 3H) ppm. ^{13}C NMR (DMSO) 170.2, 155.8, 154.0, 129.6, 129.1, 128.1, 118.8, 118.6, 107.3, 106.1, 64.6, 55.1 ppm. MS (CI) 250 ($[M+NH_4]^+$). Analysis calculated for $C_{13}H_{12}O_4$: C, 67.23 %; H, 5.21 %. Found C, 67.31 %; H, 5.24 %.

2-(3-Methoxynaphthalen-2-yloxy)acetic acid: ^1H NMR (DMSO) 7.74 (dd, ArH, J_{HH} = 6.6 Hz, J_{HH} = 2.3 Hz), 7.71 (dd, ArH, 1H, J_{HH} = 6.6 Hz, J_{HH} = 2.3 Hz), 7.31 (m, ArH, 3H), 7.21 (s, ArH, 1H), 4.80 (s, OCH_2, 2H), 3.90 (s, OCH_3, 3H) ppm. ^{13}C NMR (DMSO) 169.9, 149.2, 147.5, 129.1, 128.5, 126.2, 126.1, 124.1, 123.9, 107.5, 106.7, 64.7, 55.4 ppm. MS (CI) 250 ($[M+NH_4]^+$).

2-(7-Methoxynaphthalen-2-yloxy)acetic acid: ^1H NMR (DMSO) 7.74 (d, ArH, 1H, J_{HH} = 8.8Hz), 7.73 (d, ArH, 1H, J_{HH} = 8.8Hz), 7.20 (d, ArH, 1H, J_{HH} = 2.3Hz), 7.16 (d, ArH, 1H, J_{HH} = 2.3Hz), 7.01 (dd, ArH, 1H, J_{HH} = 9.6Hz, J_{HH} = 2.3Hz), 6.99 (dd, ArH, 1H, J_{HH} = 9.6Hz, J_{HH} = 2.3Hz), 4.77 (s, OCH_2, 2H), 3.85 (s, OCH_3, 3H) ppm. ^{13}C NMR (DMSO) 170.1, 157.7, 156.2, 135.5, 129.1, 128.9, 123.9, 116.1, 116.6, 106.4, 105.4, 64.4, 55.1 ppm. MS (CI) 250 ($[M+NH_4]^+$).

Ethyl 2-(2-(2-(6-methoxynaphthalen-2-yloxy)acetamido)-3-phenylpropanamido)-3-phenylpropanoate: ^1H NMR ($CDCl_3$) 7.68 (d, ArH, 1H, J_{HH} = 8.9 Hz), 7.61 (d, ArH, 1H, J_{HH} = 8.9 Hz), 7.16 (m, ArH and NH, 12H), 7.03 (d, ArH, 1H, J_{HH} = 2.4 Hz), 6.98 (m, ArH, 2H), 6.39 (d, NH, 1H, J_{HH} = 7.6 Hz), 4.73 (m, CHNH, 2H), 4.51 (s, OCH_2, 2H), 4.13 (m, CH_2CH_3, 2H), 3.91 (s, OCH_3, 3H), 3.03 (m, CH_2Ph, 4H), 1.21 (t, CH_3, 3H, J_{HH} = 7.1 Hz) ppm. ^{13}C NMR ($CDCl_3$) 170.9, 169.9, 168.4, 156.7, 153.5, 136.0, 135.6, 130.5, 129.4, 129.3, 129.2, 128.7, 128.5, 128.4, 127.1, 127.1, 119.4, 118.4, 107.9, 106.0, 67.3, 61.6, 55.3, 53.7, 53.3, 50.9, 37.8, 14.1 ppm. MS (ES) 577 ($[M+Na]^+$). Accurate mass calculated for $C_{33}H_{34}N_2O_6Na$: 577.2315. Found: 577.2304.

Ethyl 2-(2-(2-(3-methoxynaphthalen-2-yloxy)acetamido)-3-phenylpropanamido)-3-phenylpropanoate: ^1H NMR ($CDCl_3$) 7.70 (d, ArH, 1H, J_{HH} = 7.6 Hz), 7.65 (d, ArH, 1H, J_{HH} = 7.4 Hz), 7.38 (m, ArH, 3H), 7.13 (m, ArH and NH, 10H), 6.99 (d, ArH, 2H, J_{HH} = 6.8), 6.35 (d, NH, 1H, J_{HH} = 7.6 Hz), 4.70 (m, CHNH, 2H), 4.57 (s, OCH_2, 2H), 4.12 (m, CH_2CH_3, 2H), 3.99 (s, OCH_3, 3H), 3.03 (m, CH_2Ph, 4H), 1.20 (t, CH_3, 3H, J_{HH} = 7.1 Hz) ppm. ^{13}C NMR ($CDCl_3$) 170.9, 169.8, 168.6, 14.5, 147.4, 136.2, 135.7, 130.1, 129.2, 128.8, 128.6, 128.5, 127.1, 126.9, 126.7, 126.4, 25.1, 124.5, 110.1, 107.1, 68.8, 61.5, 55.8, 54.1, 53.3, 37.8, 37.7, 14.1 ppm. MS (ES) 577 ($[M+Na]^+$). Accurate mass calculated for $C_{33}H_{34}N_2O_6Na$: 577.2315. Found: 577.2302.

Ethyl 2-(2-(2-(7-methoxynaphthalen-2-yloxy)acetamido)-3-phenylpropanamido)-3-phenylpropanoate: ^{1}H NMR ($CDCl_3$) 7.70 (d, ArH, 1H, J_{HH} = 9.4 Hz), 7.68 (d, ArH, 1H, J_{HH} = 9.4 Hz), 7.16 (m, ArH and NH, 9H), 7.04 (m, ArH, 2H), 6.98 (m, ArH, 4H), 6.38 (d, NH, 1H, J_{HH} = 7.6 Hz), 4.74 (m, CHNH, 2H), 4.53 (s, OCH_2, 2H), 4.13 (m, CH_2CH_3, 2H), 3.91 (s, OCH_3, 3H), 3.05 (m, CH_2Ph, 4H), 1.21 (t, CH_3, 3H, J_{HH} = 7.2 Hz) ppm. ^{13}C NMR ($CDCl_3$) 170.9, 169.9, 168.4, 158.4, 55.5, 135.9, 135.7, 135.6, 129.7, 129.3, 129.2, 129.1, 128.6, 128.5, 127.1, 124.9, 116.9, 15.4, 106.8, 105.4, 67.1, 55.3, 53.8, 53.3, 50.8, 37.8, 14.1 ppm. MS (ES) 577 ($[M+Na]^+$). Accurate mass calculated for $C_{33}H_{34}N_2O_6Na$: 577.2315. Found: 577.2308.

2-(2-(2-(6-Methoxynaphthalen-2-yloxy)acetamido)-3-phenylpropanamido)-3-phenylpropanoic acid (Conjugate 1s): ^{1}H NMR (DMSO) 8.44 (d, NH, 1H, J_{HH} = 7.8 Hz), 8.07 (d, NH, 1H, J_{HH} = 8.6 Hz), 7.73 (d, ArH, 1H, J_{HH} = 9.7Hz), 7.64 (d, ArH, 2H, J_{HH} = 8.9 Hz), 7.18 (m, ArH, 14 H), 4.64 (m, CHNH, 1H), 4.49 (s, OCH_2, 2H), 4.48 (m, CHNH, 1H), 3.84 (s, OCH_3, 3H), 3.07 (dd, CHPh, 1H, J_{HH} = 13.9 Hz, J_{HH} = 5.4 Hz), 3.03 (dd, CHPh, 1H, J_{HH} = 13.9Hz, J_{HH} = 5.4 Hz), 2.93 (dd, CHPh, 1H, J_{HH} = 13.9 Hz, J_{HH} = 9.7 Hz), 2.85 (dd, CHPh, 1H, J_{HH} = 13.9 Hz, J_{HH} = 9.7Hz) ppm. ^{13}C NMR (DMSO) 172.7, 170.8, 167.3, 155.8, 153.9, 137.4, 137.3, 129.7, 129.2, 129.1, 128.1, 128.1, 128.1, 129.9, 126.4, 126.2, 118.8, 118.6, 107.7, 106.1, 66.7, 55.1, 53.4, 53.1, 37.3, 36.3 ppm. MS (ES) 549 ($[M+Na]^+$). Accurate mass calculated for $C_{31}H_{30}N_2O_6Na$: 549.2002. Found: 577.2003

2-(2-(2-(3-Methoxynaphthalen-2-yloxy)acetamido)-3-phenylpropanamido)-3-phenylpropanoic acid (Conjugate 4): ^{1}H NMR (DMSO) 8.50 (d, NH, 1H, J_{HH} = 7.9 Hz), 8.00 (d, NH, 1H, J_{HH} = 8.5 Hz), 7.76 (d, ArH, 1H, J_{HH} = 8.8 Hz), 7.63 (d, ArH, 2H, J_{HH} = 8.8 Hz), 7.18 (m, ArH, 14 H), 4.66 (m, CHNH, 1H), 4.55 (s, OCH_2, 2H), 4.47 (m, CHNH, 1H), 3.88 (s, OCH_3, 3H), 3.07 (dd, CHPh, 1H, J_{HH} = 13.9 Hz, J_{HH} = 5.4 Hz), 3.02 (dd, CHPh, 1H, J_{HH} = 13.9Hz, J_{HH} = 5.4 Hz), 2.91 (dd, CHPh, 1H, J_{HH} = 13.9Hz, J_{HH} = 8.7 Hz), 2.81 (dd, CHPh, 1H, J_{HH} = 13.9 Hz, J_{HH} = 8.7Hz) ppm. ^{13}C NMR (DMSO) 172.7, 170.6, 167.1, 149.2, 147.5, 137.3, 137.2, 129.63, 129.2, 129.1, 128.5, 128.1, 127.9, 126.4, 126.3, 126.2, 126.1, 124.3, 123.9, 108.7, 106.8, 67.5, 55.5, 53.5, 53.1, 37.7, 36.7 ppm. MS (ES) 549 ($[M+Na]^+$). Accurate mass calculated for $C_{31}H_{30}N_2O_6Na$: 549.2002. Found: 577.1999

2-(2-(2-(7-Methoxynaphthalen-2-yloxy)acetamido)-3-phenylpropanamido)-3-phenylpropanoic acid (Conjugate 5): ^{1}H NMR (DMSO) 8.44 (d, NH, 1H, J_{HH} = 7.8 Hz), 8.10 (d, NH, 1H, J_{HH} = 8.6 Hz), 7.73 (d, ArH, 2H, J_{HH} = 8.9Hz), 7.16 (m, ArH, 12 H), 6.99 (m, ArH, 2H), 4.65 (m, CHNH, 1H), 4.51 (s, OCH_2, 2H), 4.48 (m, CHNH, 1H), 3.86 (s, OCH_3, 3H), 3.08 (dd, CHPh, 1H, J_{HH} = 14.0 Hz, J_{HH} = 5.3 Hz), 3.02 (dd, CHPh, 1H, J_{HH} = 14.0 Hz, J_{HH} = 5.3 Hz), 2.92 (dd, CHPh, 1H, J_{HH} = 14.0 Hz, J_{HH} = 8.8Hz), 2.85 (dd, CHPh, 1H, J_{HH} = 14.0 Hz, J_{HH} = 8.8Hz) ppm. ^{13}C NMR (DMSO) 172.7, 170.8, 167.2, 157.7, 156.0, 137.4, 137.3, 135.5, 129.2, 129.1, 128.9, 128.1, 127.9, 126.4, 126.4, 116.1, 115.6, 106.8, 105.4, 66.6, 55.1, 53.5, 53.2, 37.4, 36.6 ppm. MS (ES) 549 ($[M+Na]^+$). Accurate mass calculated for $C_{31}H_{30}N_2O_6Na$: 549.2002. Found: 549.2005.

Conjugates **6a-6c** were prepared by reaction of the respective acyl chloride with phenylalanine ethyl ester in the presence of triethylamine. After deprotection with lithium hydroxide, further coupling with phenylalanine ethyl ester in the presence of triethylamine and deprotection with lithium hydroxide afforded the conjugates.

Ethyl 2-dodecanamido-3-phenylpropanoate. ^{1}H NMR ($CDCl_3$) 7.30 – 7.23 (m, ArH, 4H), 7.10 (dd, ArH, 1H, J_{HH} = 6.4 Hz, J_{HH} = 1.6 Hz), 5.86 (d, NH, 1H, J_{HH} = 7.6 Hz), 4.87 (dt, CHNH, 1H, J_{HH} = 8.8 Hz, J_{HH} = 7.8 Hz), 4.17 (q, CH_2CH_3, 2H, J_{HH} = 7.2 Hz), 3.12 (m, CH_2Ph, 2H), 2.17 (m, CH_2, 2H), 1.58 (m, CH_2, 2H), 1.25 (m, CH_2 and CH_2CH_3, 18H), 0.88 (t, CH_3, 3H, J_{HH} = 6.7 Hz) ppm. ^{13}C NMR ($CDCl_3$) 172.6, 171.8, 135.9, 129.3, 128.5, 127.1, 61.5, 52.9, 37.9, 36.6, 31.9, 29.6, 19.5, 19.3, 19.2, 15.6, 22.7, 14.1 ppm. MS (ES^+) 398.1 ($[M+Na]^+$). Accurate Mass calculated for $C_{23}H_{37}NO_3Na$: 398.2671. Found, 398.2653.

2-Dodecanamido-3-phenylpropanoic acid. (^{1}H NMR (DMSO) 8.07 (d, NH, 1H, J = 8.2 Hz), 7.28 – 7.16 (m, ArH, 5H), 4.42 (m, CHNH, 1H), 3.04 (dd, CHPh, 1H, J = 13.8 Hz, J = 4.7 Hz), 2.83 (dd, CHPh, 1H, J = 13.8 Hz, J = 9.9 Hz), 2.02 (t, CH_2CO, 2H, J = 7.3 Hz), 1.35 (m, CH_2CH_2CO, 2H), 1.29 – 1.09 (m, CH_2, 16H), 0.86 (t, CH_3, 3H, J = 7.0 Hz) ppm. ^{13}C NMR (DMSO) 173.2, 172.1, 137.8, 129.0, 128.0, 126.3, 53.2, 36.7, 35.0, 31.3, 28.9, 28.8, 28.7, 28.6, 28.4, 25.1, 22.1, 13.9 ppm. MS (ES^+) 370.2 ($[M+Na]^+$). Accurate Mass calculated for $C_{21}H_{33}NO_3Na$: 370.2358. Found, 370.2373.

Ethyl 3-phenyl-2-tetradecanamidopropanoate. ^{1}H NMR ($CDCl_3$) 7.29 – 7.23 (m, ArH, 4H), 7.10 (dd, ArH, 1H, J_{HH} = 8.1Hz, J_{HH} = 1.6 Hz), 5.87 (d, NH, 1H, J_{HH} = 7.7 Hz), 4.88 (dt, CHNH, 1H, J_{HH} = 7.8 Hz, J_{HH} = 5.9 Hz), 4.17 (q, CH_2CH_3, 2H, J_{HH} = 7.1 Hz), 3.12 (m, CH_2Ph, 2H), 2.17 (m, CH_2, 2H), 1.58 (m, CH_2, 2H), 1.25 (m, CH_2 and CH_2CH_3, 22H), 0.88 (t, CH_3, 3H, J_{HH} = 7.0 Hz) ppm. ^{13}C NMR ($CDCl_3$) 172.6, 171.8, 135.9, 129.3, 128.5, 127.1, 61.5, 52.9, 37.9, 31.9, 30.9, 29.7, 29.6, 29.5, 29.4, 29.3, 29.2, 15.6, 22.7, 14.1 ppm. MS (ES^+) 426.1 ($[M+Na]^+$). Accurate Mass calculated for $C_{25}H_{41}NO_3Na$: 426.2984. Found, 426.2993.

3-Phenyl-2-tetradecanamidopropanoic acid. ^{1}H NMR (DMSO) 8.07 (d, NH, 1H, J = 8.2 Hz), 7.28 – 7.16 (m, ArH, 5H), 4.41 (m, CHNH, 1H), 3.04 (dd, CHPh, 1H, J = 13.8 Hz, J = 4.7 Hz), 2.82 (dd, CHPh, 1H, J = 13.8 Hz, J = 9.9 Hz), 2.02 (t, CH_2CO, 2H, J = 7.3 Hz), 1.35 (m, CH_2CH_2CO, 2H), 1.29 – 1.09 (m, CH_2, 20H), 0.86 (t, CH_3, 3H, J = 7.1 Hz) ppm. ^{13}C NMR (DMSO) 173.2, 172.1, 137.8, 129.0, 128.0, 126.3, 66.9, 53.2, 36.7, 35.0, 31.3, 29.0, 28.9, 28.8, 28.7, 28.6, 28.4, 25.1, 22.1, 13.9 ppm. MS (ES^+) 398.3 ($[M+Na]^+$). Accurate Mass calculated for $C_{23}H_{37}NO_3Na$: 398.2671. Found, 398.2662.

Ethyl 2-palmitamido-3-phenylpropanoate. ^{1}H NMR ($CDCl_3$) 7.29 – 7.23 (m, ArH, 4H), 7.10 (dd, ArH, 1H, J_{HH} = 8.1Hz, J_{HH} = 1.6 Hz), 5.89 (d, NH, 1H, J_{HH} = 7.8 Hz), 4.88 (dt, CHNH, 1H, J_{HH} = 7.8 Hz, J_{HH} = 5.9 Hz), 4.16 (q, CH_2CH_3, 2H, J_{HH} = 7.1 Hz), 3.12 (m, CH_2Ph, 2H), 2.17 (t, CH_2, 2H, J_{HH} = 6.7 Hz), 1.58 (m, CH_2, 2H), 1.25 (m, CH_2 and CH_2CH_3, 26H), 0.87 (t, CH_3, 3H, J_{HH} = 6.6 Hz) ppm. ^{13}C NMR ($CDCl_3$) 172.7, 171.8, 135.9, 129.5, 129.3, 128.5, 127.1, 61.5, 52.9, 37.9, 36.6, 31.9, 30.9, 29.7, 29.6, 2935, 29.4, 29.3, 29.2, 25.6, 22.7, 14.1 ppm. MS (ES^+) 454.2 ($[M+Na]^+$). Accurate Mass calculated for $C_{27}H_{45}NO_3Na$: 454.3297. Found, 454.3284.

2-Palmitamido-3-phenylpropanoic acid. ^{1}H NMR (DMSO) 7.98 (d, NH, 1H, *J* = 8.2 Hz), 7.26 – 7.17 (m, ArH, 5H), 4.39 (m, CHNH, 1H), 3.05 (dd, CHPh, 1H, *J* = 13.7 Hz, *J* = 4.7 Hz), 2.82 (dd, CHPh, 1H, *J* = 13.8 Hz, *J* = 9.6 Hz), 2.01 (t, CH_2CO, 2H, *J* = 7.3 Hz), 1.37 (m, CH_2CH_2CO, 2H), 1.27 – 1.10 (m, CH_2, 20H), 0.85 (t, CH_3, 3H, *J* = 6.6 Hz) ppm. ^{13}C NMR (DMSO) 173.3, 171.9, 138.0, 129.1, 127.9, 126.1, 53.5, 36.8, 35.1, 31.3, 29.0, 28.9, 28.8, 28.7, 28.6, 28.4, 25.2, 22.1, 13.9 ppm. MS (ES^+) 426.3 ($[M+Na]^+$). Accurate Mass calculated for $C_{25}H_{41}NO_3Na$: 426.2984. Found, 426.2979.

Ethyl 2-(2-dodecanamido-3-phenylpropanamido)-3-phenylpropanoate: ^{1}H NMR ($CDCl_3$) 7.29 – 7.18 (m, ArH, 8H), 7.00 (dd, ArH, 2H, J_{HH} = 7.8 Hz, J_{HH} = 2.5 Hz), 6.16 (d, NH, 1H, J_{HH} = 7.8 Hz), 5.92 (d, NH, 1H, J_{HH} = 7.7 Hz), 4.71 (dt, CHNH, 1H, J_{HH} = 7.4 Hz, J_{HH} = 6.1 Hz), 4.62 (dt, CHNH, 1H, J_{HH} = 7.3 Hz, J_{HH} = 6.9 Hz), 4.13 (m, CH_2CH_3, 2H), 3.02 (m, CH_2Ph, 4H), 2.11 (dt, CH_2, 2H, J_{HH} = 6.9 Hz, J_{HH} = 2.1 Hz), 1.53 (m, CH_2, 2H), 1.24 (m, CH_2 and CH_2CH_3, 19H), 0.88 (t, CH_3, 3H, J_{HH} = 7.3 Hz) ppm. ^{13}C NMR ($CDCl_3$) 172.9, 170.8, 170.4, 136.4, 135.6, 129.3, 129.2, 128.7, 128.5, 127.1, 127.1, 61.5, 54.1, 53.4, 38.1, 37.9, 36.6, 31.9, 30.9, 29.6, 29.5, 29.3, 29.2, 26.5, 22.7, 14.1 ppm. MS (ES^+) 545.3 ($[M+Na]^+$). Accurate Mass calculated for $C_{32}H_{46}N_2O_4Na$: 545.3355. Found, 545.3363.

2-(2-Dodecanamido-3-phenylpropanamido)-3-phenylpropanoic acid (Conjugate 6a): ^{1}H NMR (DMSO) 8.12 (d, NH, 1H, *J* = 7.6 Hz), 7.93 (d, NH, 1H, *J* = 8.6 Hz), 7.28 – 7.11 (m, ArH, 10H), 4.52 (m, CHNH, 1H), 4.40 (m, CHNH, 1H), 3.08 (dd, CHPh, 1H, *J* = 13.9 Hz, *J* = 5.2 Hz), 2.98 (dd, CHPh, 1H, *J* = 13.9 Hz, *J* = 4.1 Hz), 2.93 (dd, CHPh, 1H, *J* = 13.8 Hz, *J* = 8.2 Hz), 2.67 (dd, CHPh, 1H, *J* = 13.8 Hz, *J* = 10.5 Hz), 1.96 (t, CH_2CO, 2H, *J* = 7.3 Hz), 1.23 (m, CH_2, 16H), 1.04 (m, CH_2CH_2CO, 2H),0.86 (t, CH_3, 3H, *J* = 6.1 Hz) ppm. ^{13}C NMR (DMSO) 173.3, 171.9, 171.4, 138.0, 129.2, 129.1, 128.1, 127.8, 126.3, 126.0, 53.5, 53.4, 37.4, 36.6, 35.1, 31.3, 28.9, 28.8, 28.7, 28.6, 28.3, 25.1, 22.1, 13.9 ppm. MS (ES^+) 517.3 ($[M+Na]^+$). Accurate Mass calculated for $C_{30}H_{42}N_2O_4Na$: 517.3042. Found, 517.3018.

Ethyl 3-phenyl-2-(3-phenyl-2-tetradecanamidopropanamido)propanoate: ^{1}H NMR ($CDCl_3$) 7.29 – 7.18 (m, ArH, 8H), 7.00 (dd, ArH, 2H, J_{HH} = 7.6 Hz, J_{HH} = 2.4 Hz), 6.17 (d, NH, 1H, J_{HH} = 7.4 Hz), 5.93 (d, NH, 1H, J_{HH} = 7.6 Hz), 4.70 (dt, CHNH, 1H, J_{HH} = 7.4 Hz, J_{HH} = 6.2 Hz), 4.63 (dt, CHNH, 1H, J_{HH} = 7.2 Hz, J_{HH} = 7.1 Hz), 4.12 (m, CH_2CH_3, 2H), 3.01 (m, CH_2Ph, 4H), 2.11 (dt, CH_2, 2H, J_{HH} = 8.1 Hz, J_{HH} = 2.0 Hz), 1.52 (m, CH_2, 2H), 1.24 (m, CH_2 and CH_2CH_3, 23H), 0.88 (t, CH_3, 3H, J_{HH} = 7.0 Hz) ppm. ^{13}C NMR ($CDCl_3$) 172.9, 170.8, 170.4, 136.4, 135.6, 129.3, 129.2, 128.6, 128.5, 127.1, 127.0, 61.5, 54.1, 53.4, 38.1, 27.9, 36.6, 31.9, 29.7, 29.7, 29.6, 29.5, 29.4, 29.3, 29.2, 25.5, 22.7, 14.1, 14.0 ppm. MS (ES^+) 573.3 ($[M+Na]^+$). Accurate Mass calculated for $C_{34}H_{50}N_2O_4Na$: 573.3668. Found, 573.3674.

Ethyl 2-(2-palmitamido-3-phenylpropanamido)-3-phenylpropanoate: ^{1}H NMR ($CDCl_3$) 7.29 – 7.15 (m, ArH, 8H), 7.00 (dd, ArH, 2H, J_{HH} = 7.6 Hz, J_{HH} = 2.2 Hz), 6.17 (d, NH, 1H, J_{HH} = 7.5 Hz), 5.93 (d, NH, 1H, J_{HH} = 7.6 Hz), 4.71 (m, CHNH, 1H), 4.62 (m, CHNH, 1H), 4.14 (m, CH_2CH_3, 2H), 3.03 (m, CH_2Ph, 4H), 2.12 (m, CH_2, 2H), 1.53 (m, CH_2, 2H), 1.26 (m, CH_2 and CH_2CH_3, 27H), 0.88 (t, CH_3, 3H, J_{HH} = 7.1 Hz) ppm. ^{13}C NMR ($CDCl_3$) 173.0, 170.8, 17.4, 136.4, 135.7, 129.3, 129.3, 128.6, 128.5, 127.1, 127.0, 61.5, 54.0, 53.4, 38.1,

37.9, 36.6, 31.9, 29.7, 29.6, 26.6, 29.5, 29.4, 29.3, 129.2, 25.5, 22.7, 14.1, 14.0 ppm. MS (ES^+) 601.0 ($[M+Na]^+$). Accurate Mass calculated for $C_{36}H_{54}N_2O_4Na$: 601.3981. Found, 601.3959.

2-(2-Palmitamido-3-phenylpropanamido)-3-phenylpropanoic acid (Conjugate 6c): ^1H NMR (DMSO) 8.15 (d, NH, 1H, *J* = 7.5 Hz), 7.94 (d, NH, 1H, *J* = 8.5 Hz), 7.28 – 7.07 (m, ArH, 10H), 4.53 (m, CHNH, 1H), 4.42 (m, CHNH, 1H), 3.07 (dd, CHPh, 1H, *J* = 13.8 Hz, *J* = 4.6 Hz), 2.93 (m, CHPh, 2H), 2.68 (dd, CHPh, 1H, *J* = 13.8 Hz, *J* = 11.0 Hz), 1.96 (t, CH_2CO, 2H, *J* = 6.7 Hz), 1.24 (m, CH_2, 24H), 1.02 (m, CH_2CH_2CO, 2H),0.85 (t, CH_3, 3H, *J* = 6.6 Hz) ppm. ^{13}C NMR (DMSO) 172.7, 171.9, 171.4, 138.0, 137.4, 129.1, 128.1, 127.8, 126.3, 126.0, 53.5, 53.4, 37.4, 36.6, 35.2, 31.3, 29.0, 28.9, 28.8, 28.7, 28.6, 28.4, 25.1, 22.0, 13.9 ppm. MS (ES^+) 573.3 ($[M+Na]^+$). Accurate Mass calculated for $C_{34}H_{50}N_2O_4Na$: 573.3668. Found, 573.3649.

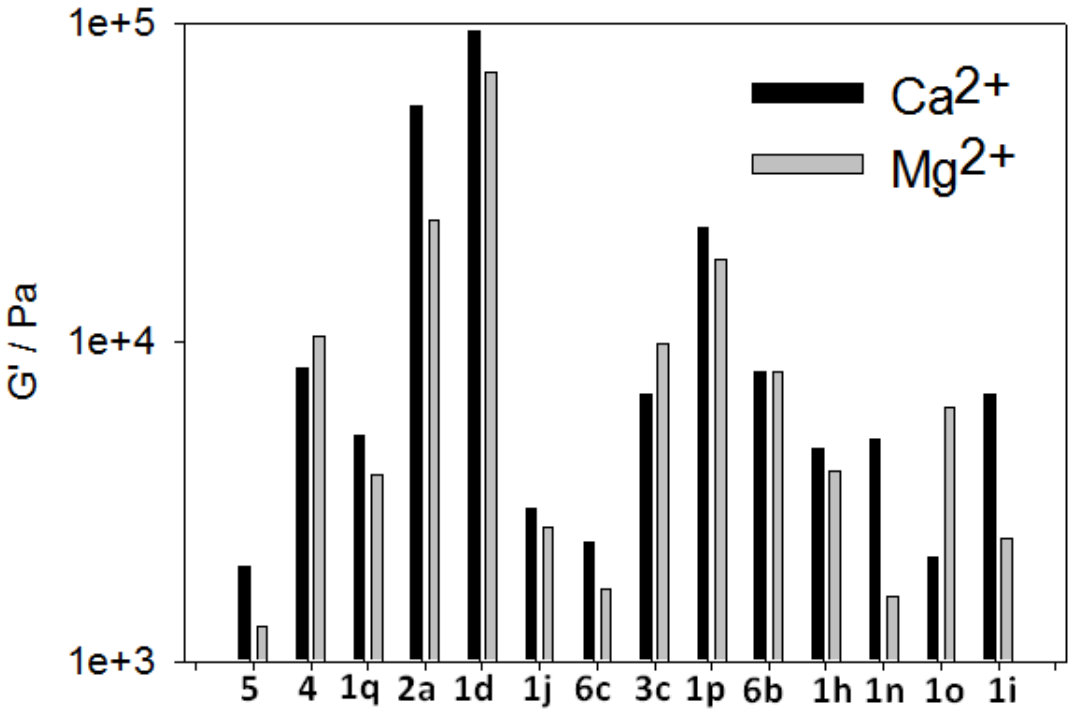

Figure S1. Rheological data showing that in the main the gels formed using calcium nitrate are stiffer than those formed using magnesium nitrate.

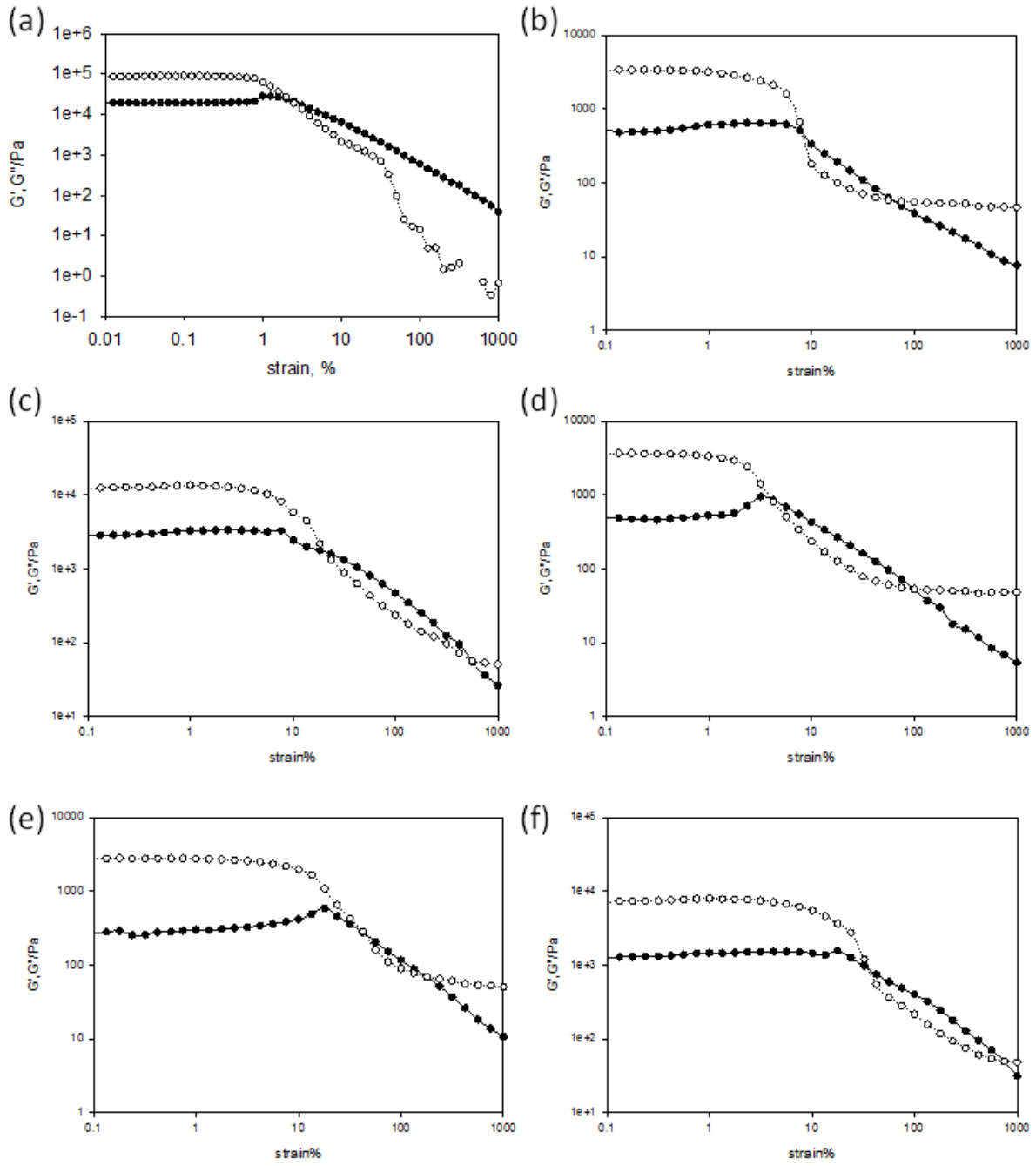

Figure S2. Strain sweeps for hydrogels prepared from different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. Gelators: (a) gelator **1d**, (b) gelator **1h**, (c) gelator **1i**, (d) gelator **1j**, (e) gelator **1n**, (f) gelator **1o**. In all cases, open symbols represent G′ and closed symbols represent G″.

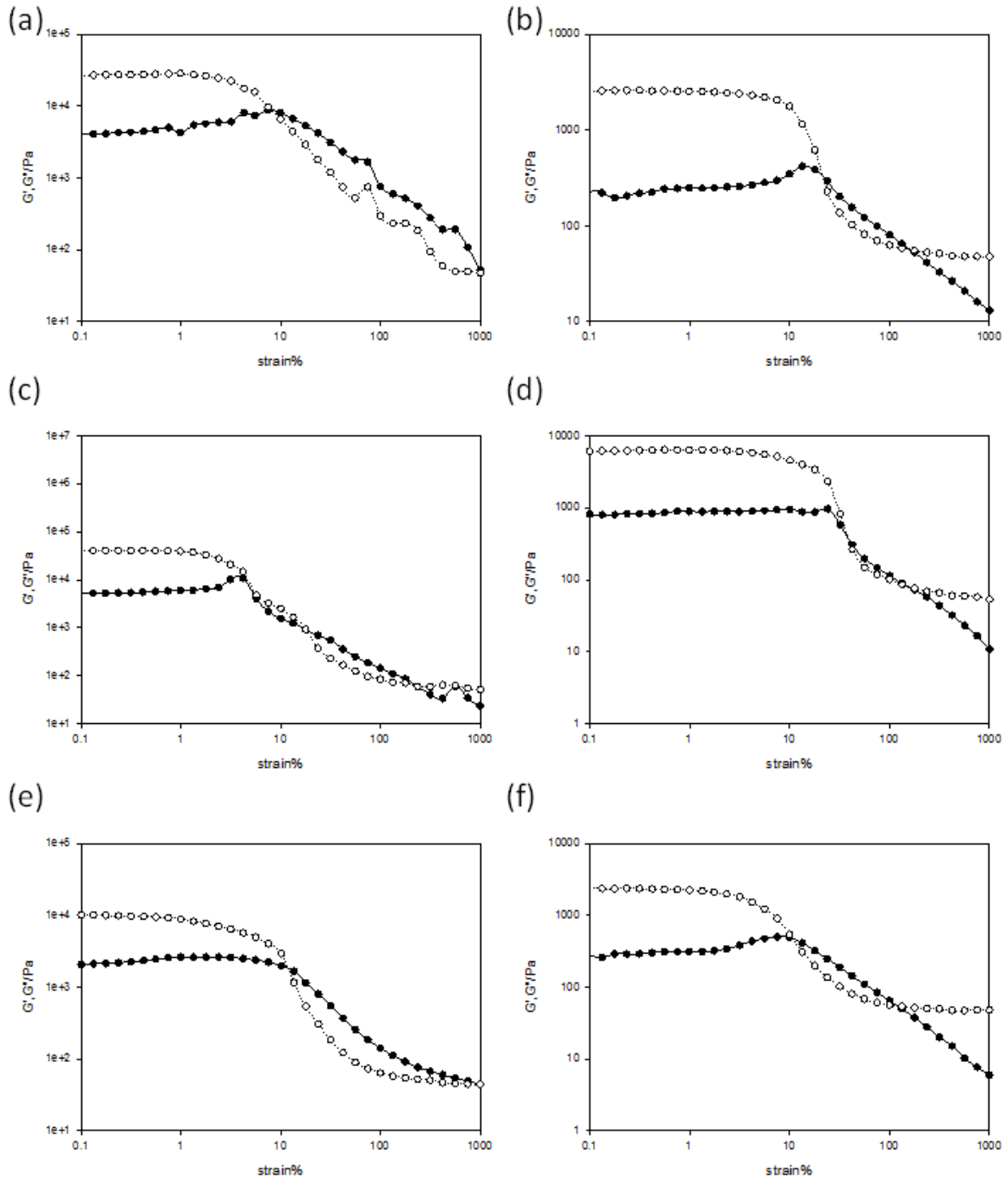

Figure S3. Strain sweeps for hydrogels prepared from different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. Gelators: (a) gelator **1p**, (b) gelator **1q**, (c) gelator **2a**, (d) gelator **3c**, (e) gelator **4**, (f) gelator **5**. In all cases, open symbols represent G′ and closed symbols represent G″.

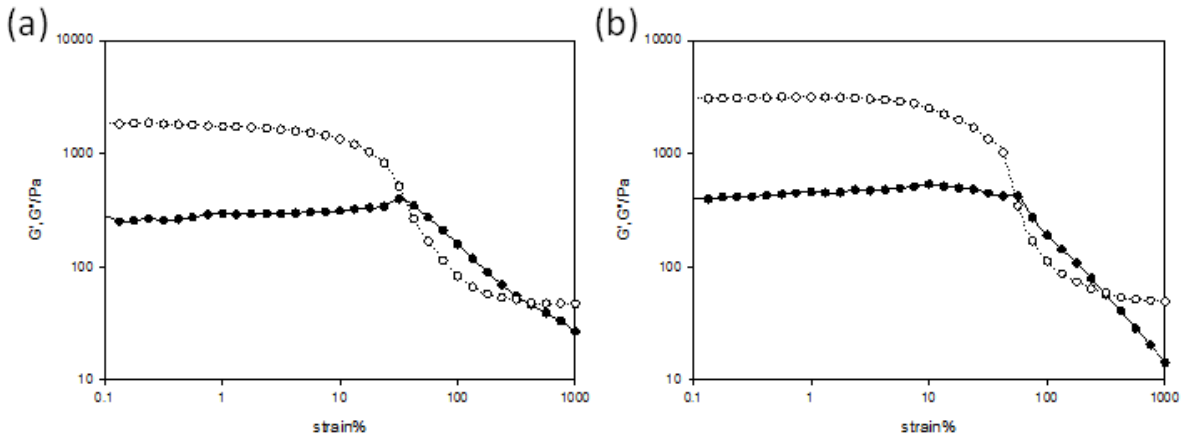

Figure S4. Strain sweeps for hydrogels prepared from different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. Gelators: (a) gelator **6b**, (b) gelator **6c.** In all cases, open symbols represent G′ and closed symbols represent G″.

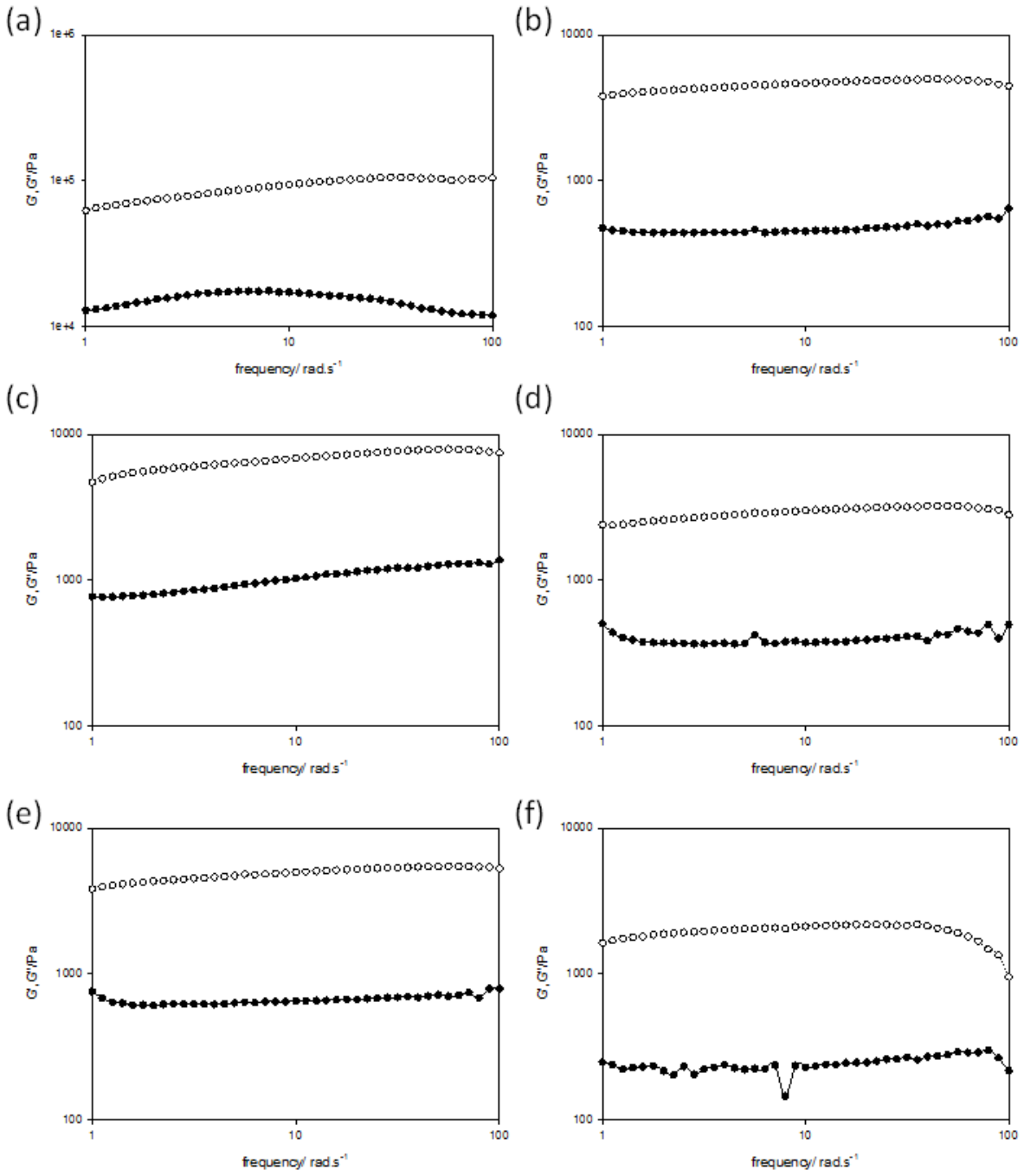

Figure S5. Frequency sweeps for hydrogels prepared from different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. Data collected at a strain of 0.5%. Gelators: (a) gelator **1d**, (b) gelator **1h**, (c) gelator **1i**, (d) gelator **1j**, (e) gelator **1n**, (f) gelator **1o**. In all cases, open symbols represent G′ and closed symbols represent G″.

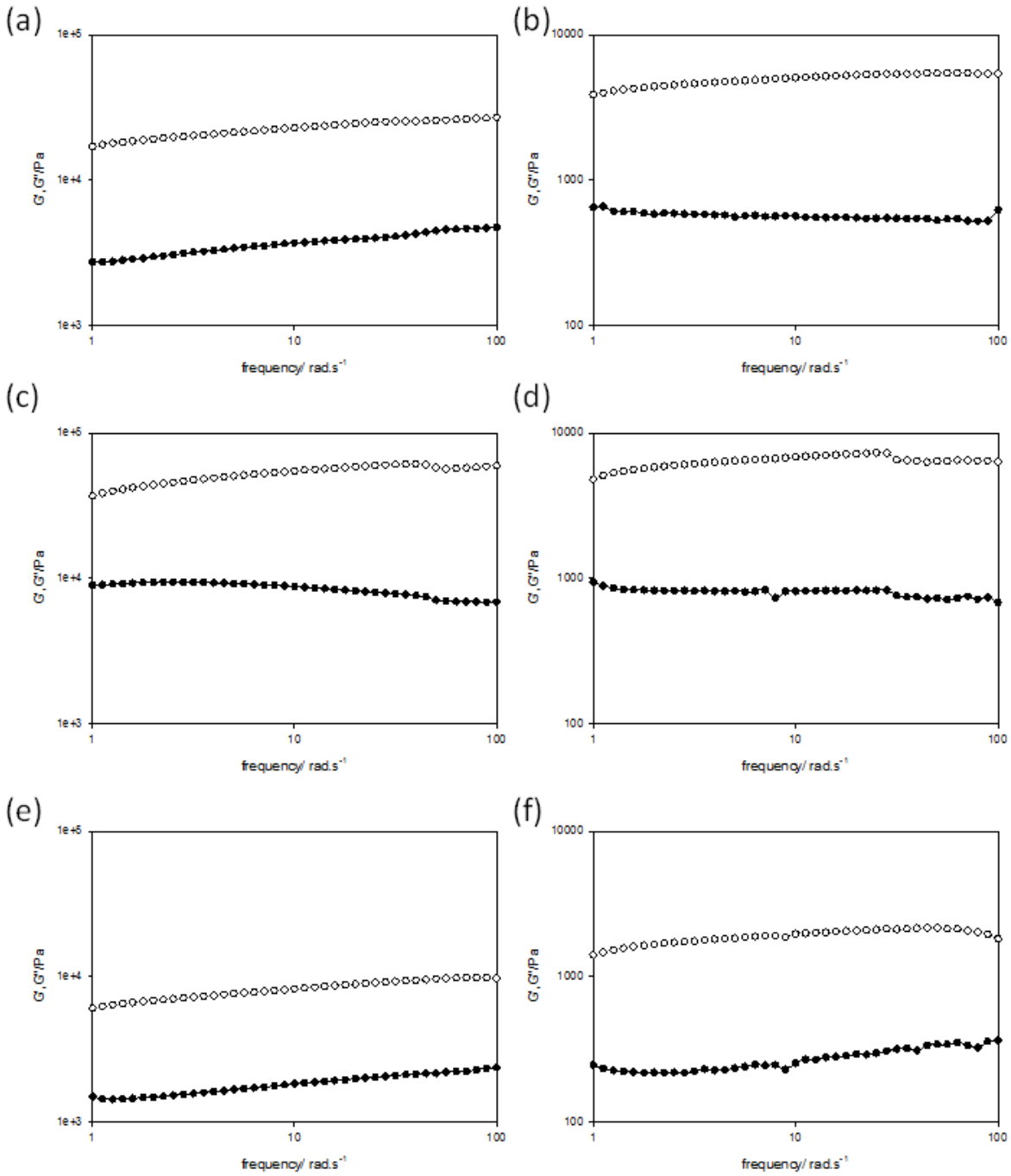

Figure S6. Frequency sweeps for hydrogels prepared from different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. Data collected at a strain of 0.5%. Gelators: (a) gelator **1p**, (b) gelator **1q**, (c) gelator **2a**, (d) gelator **3c**, (e) gelator **4**, (f) gelator **5**. In all cases, open symbols represent G′ and closed symbols represent G″.

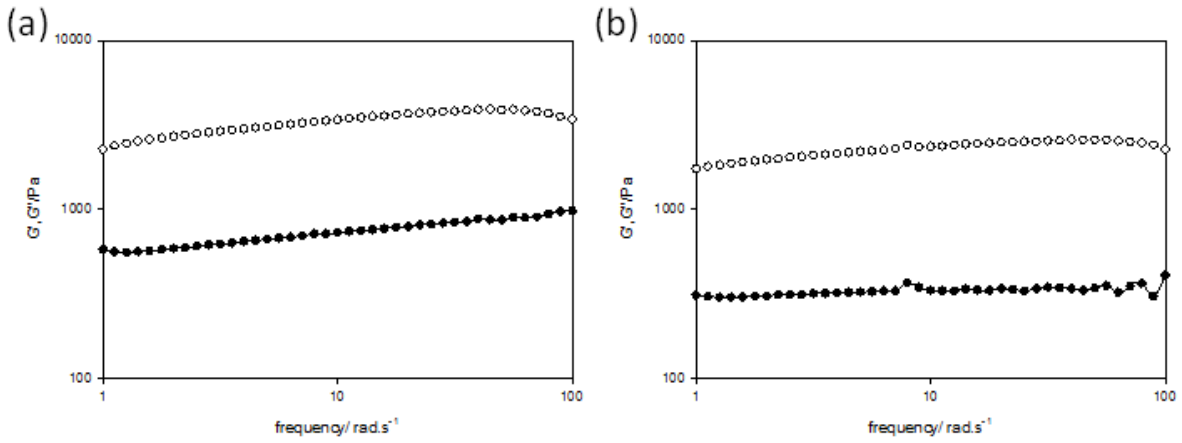

Figure S7. Frequency sweeps for hydrogels prepared from different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. Data collected at a strain of 0.5%. Gelators: (a) gelator **6b**, (b) gelator **6c.** In all cases, open symbols represent G′ and closed symbols represent G″.

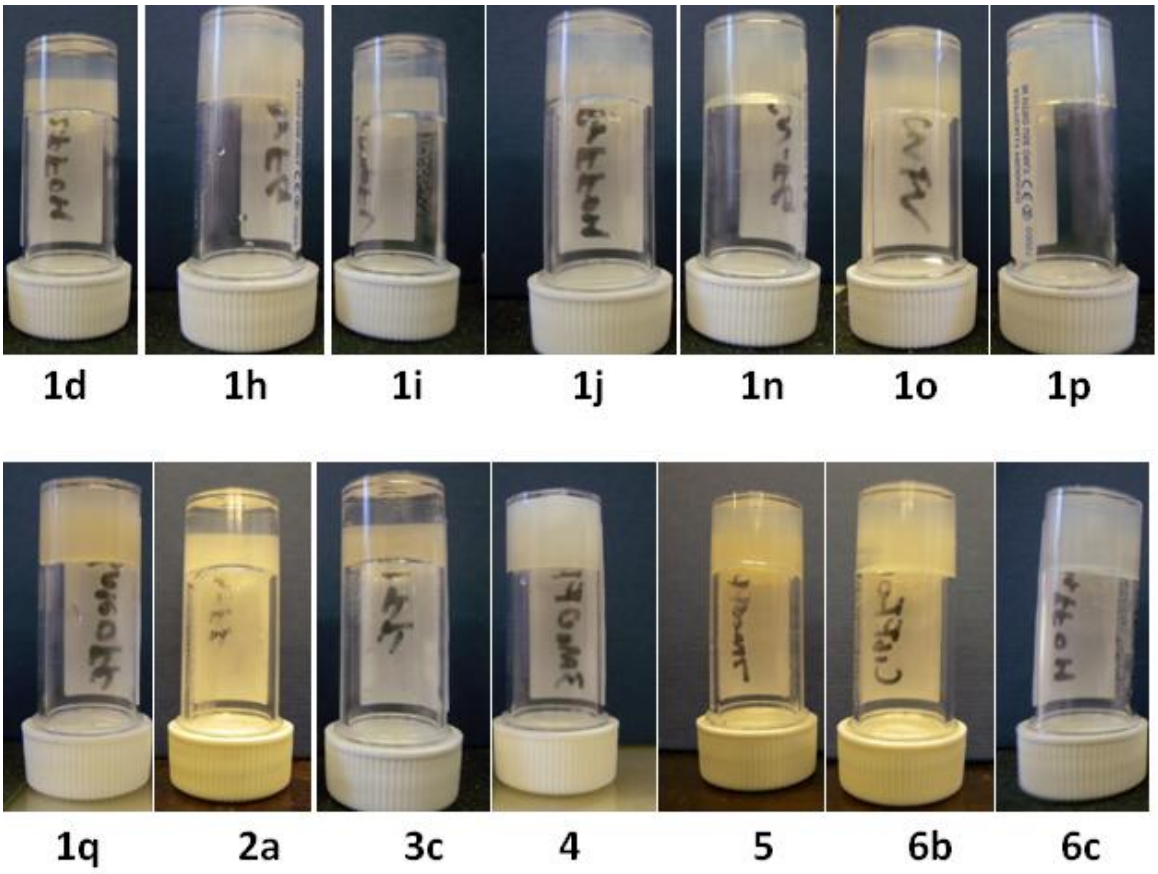

Figure S8. Photographs of the gels formed from the different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator.

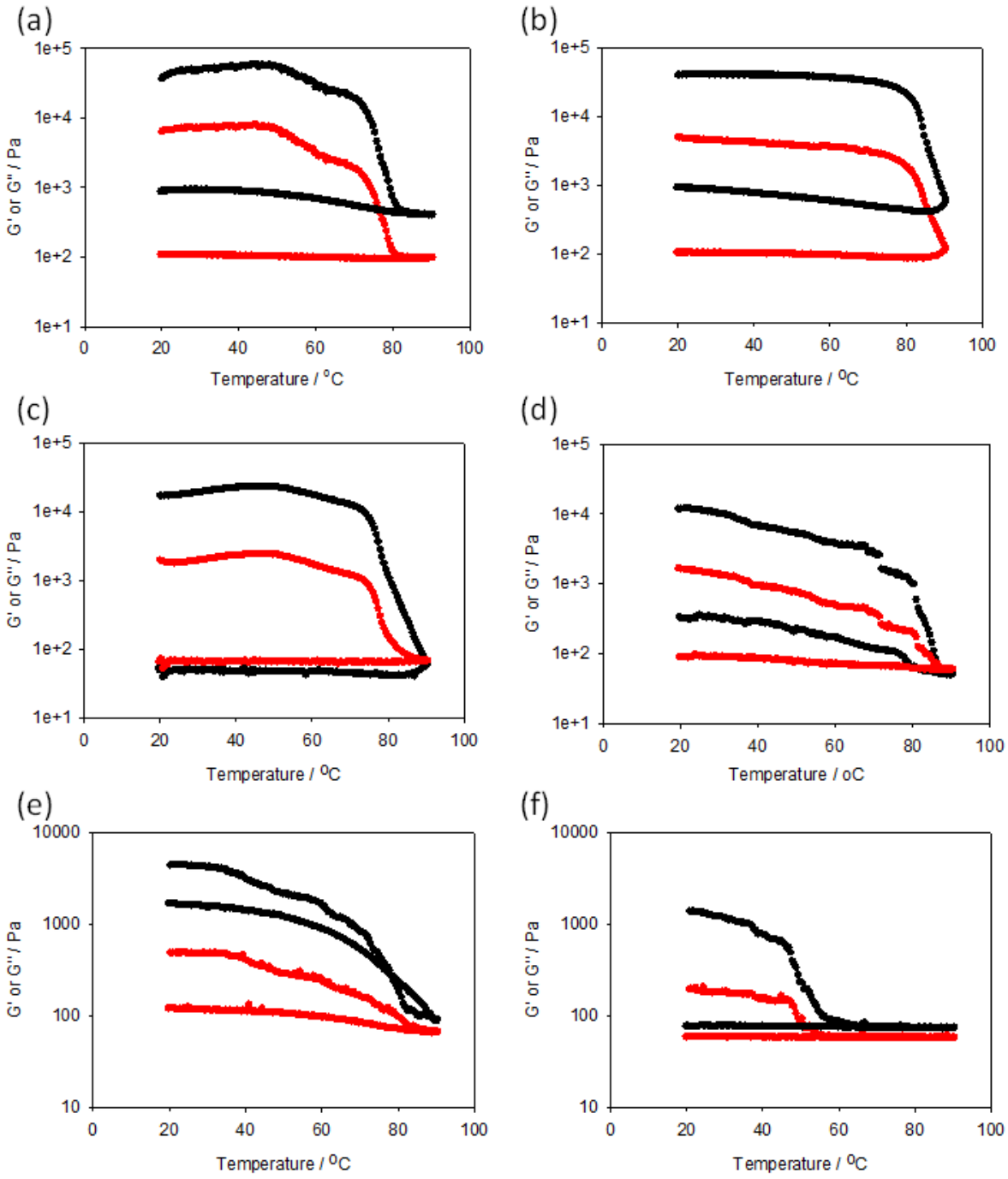

Figure S9. Rheological data on a heat-cool cycle for gels formed from the different peptides at a concentration of 0.5 wt% at pH 11.7 formed on addition of two molar equivalents of calcium nitrate compared to gelator. The gels were formed and equilibrated overnight before measurement. The gels were then heated to 90 °C at a rate of 1 °C/min, followed by cooling at the same rate. Data collected at a strain of 0.5%. Gelators: (a) gelator **1d**, (b) gelator **1h**, (c) gelator **1p**, (d) gelator **2a**, (e) gelator **3c**, (f) gelator **6c**. In all cases, black symbols represent G′ and red symbols represent G″.

References

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