For Supporting Information

Synthesis of new anionic carbosilane dendrimers through thiol-ene chemistry and their antiviral behaviour.

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Experimental Data

Synthesis of compounds $G_nSi[S(CH_2)_3(SO_3Na)_m]$ (1-3) and $GnO_3[S(CH_2)_3(SO_3Na)_m]$ (4-6)

General method: To a solution in THF/MeOH 3:1 of dendrimer precursor (G_nXY_m) water solutions with 10% excess of the stoichiometric quantity of the commercial product $HS(CH_2)_3SO_3Na$ 90% were added stepwise in four times. At the beginning of the reaction a quarter of each solution is added and the same quantity is added after 1, 2 and 3 hours, being the total reaction time 4 hours. Every time, 0.25% mol of DMPA is added and the reaction mixture is deoxygenized with argon. The reaction takes place under UV lamp with λ_{max} = 364 nm. After completation of the reaction, solvents are removed under vacuum and the product is dissolved in distilled water and purified by nanofiltration with a cellulose acetate membrane of MWCO = 500-1000 Da. Further purification of DMPA is performed through an extraction with MeOH/Et_2O. Solvent is removed under vacuum to obtain the desired products as white powders.

$G_1Si[S(CH_2)_3(SO_3Na)_8]$ (1). $C_{64}H_{132}Na_8O_{24}S_{16}Si_5$ (2123.10). White powder solid (0.26 g, 80%). **Reagents:** G_1SiA_8 (0.13 g, 0.16 mmol), sodium 3-mercapto-1-propanesulfonate (0.35 g, 1.18 mmol), DMPA (0.03 g, 0.12 mmol). **^{1}H-NMR** (D_2O): δ 3.04 (16 H, t, $SCH_2CH_2C\mathit{H}_2SO_3Na$), 2.72 (16 H, t, $SC\mathit{H}_2CH_2CH_2SO_3Na$), 2.65 (16 H, t, $SiCH_2CH_2C\mathit{H}_2S$), 2.09 (16 H, m, $SCH_2C\mathit{H}_2CH_2SO_3Na$), 1.66 (16 H, m, $SiCH_2C\mathit{H}_2CH_2S$), 1.46 (8 H, m, $SiCH_2C\mathit{H}_2CH_2Si$), 0.70 (32 H, m, $SiC\mathit{H}_2CH_2C\mathit{H}_2Si(Me)C\mathit{H}_2CH_2CH_2S$), 0.09 (12 H, s, $Si\mathit{Me}$). **^{13}C-NMR** (D_2O): δ 50.13 ($SCH_2CH_2\mathit{C}H_2SO_3Na$), 35.35 ($SiCH_2CH_2\mathit{C}H_2S$), 30.39 ($S\mathit{C}H_2CH_2CH_2SO_3Na$), 24.53 ($SCH_2\mathit{C}H_2CH_2SO_3Na$), 24.03 ($SiCH_2\mathit{C}H_2CH_2S$), 18.87 ($SiCH_2\mathit{C}H_2CH_2Si$), 17.75 ($SiCH_2CH_2\mathit{C}H_2Si$), 13.22 ($SiCH_2CH_2CH_2S$), -4.87 ($Si\mathit{Me}$). **^{29}Si-RMN** ($D_2O$): δ 2.52 ($\mathit{Si}MeCH_2CH_2CH_2S$). **Elemental Analysis:** Calc. %: C, 36.21; H, 6.27; S, 24.16; Exp

%: C, 36.54; H, 6.39; S, 24.26.

$G_3Si[S(CH_2)_3(SO_3Na)_{32}]$ (3). $C_{304}H_{636}Na_{32}O_{96}S_{64}Si_{29}$ (9430.56). White powder solid (0.80 g, 76%). **Reagents:** G_3SiA_{32} (0.42 g, 0.11 mmol), sodium 3-mercapto-1-propanesulfonate (0.77 g, 4.32 mmol), DMPA (0.11 g, 0.43 mmol). **^{1}H-NMR** (D_2O): δ 3.00 (64 H, t, $SCH_2CH_2CH_2SO_3Na$), 2.69 (64 H, t, $SCH_2CH_2CH_2SO_3Na$), 2.62 (64 H, t, $SiCH_2CH_2CH_2S$), 2.04 (64 H, m, $SCH_2CH_2CH_2SO_3Na$), 1.63 (64 H, m, $SiCH_2CH_2CH_2S$), 1.44 (56 H, m, $SiCH_2CH_2CH_2Si$), 0.67 (176 H, m, $SiCH_2CH_2CH_2Si(Me)CH_2CH_2CH_2S$), 0.04 (84 H, s, Si*Me*). **^{13}C-NMR** (D_2O): δ 50.11 ($SCH_2CH_2CH_2SO_3Na$), 35.25 ($SiCH_2CH_2CH_2S$), 30.34 ($SCH_2CH_2CH_2SO_3Na$), 24.49 ($SCH_2CH_2CH_2SO_3Na$), 23.98 ($SiCH_2CH_2CH_2S$), 18.58 ($SiCH_2CH_2CH_2Si$, $SiCH_2CH_2CH_2Si$), 13.17 ($SiCH_2CH_2CH_2S$), -4.95 (Si*Me*). **^{29}Si-RMN** (D_2O): δ 2.52 (*Si*$MeCH_2CH_2CH_2S$), 1.21 (*Si*$MeCH_2CH_2CH_2Si$). **Elemental Analysis:** Calc. %: C, 38.72; H, 6.80; S, 21.76; Exp %: C, 38.61; H, 7.26; S, 22.41.

$G_1O_3[S(CH_2)_3(SO_3Na)_6]$ (4). $C_{51}H_{96}Na_6O_{21}S_{12}Si_3$ (1652.27). White powder solid (0.41 g, 60%). **Reagents:** $G_1O_3V_6$ (0.24 g, 0.41 mmol), sodium 3-mercapto-1-propanesulfonate (0.54 g, 2.49 mmol), DMPA (0.17 g, 0.25 mmol). **^{1}H-NMR** (D_2O): δ 6.07 (3 H, s, Ar*H*), 3.89 (6 H, t, CH_2O), 2.99 (12 H, t, $SCH_2CH_2CH_2SO_3Na$), 2.68 (24 H, m, $SiCH_2CH_2S$, $SCH_2CH_2CH_2SO_3Na$), 2.01 (12 H, m, $SCH_2CH_2CH_2SO_3Na$), 1.72 (6 H, m, $OCH_2CH_2CH_2CH_2Si$), 1.43 (6 H, m, $OCH_2CH_2CH_2CH_2Si$), 0.92 (12 H, t, $SiCH_2CH_2S$), 0.59 (6 H, m, $OCH_2CH_2CH_2CH_2Si$), 0.04 (9 H, s, Si*Me*). **^{13}C-NMR** (D_2O): δ 160.48 (C_{ipso}), 94.32 (Ar*C*), 67.73 (OCH_2), 50.04 ($SCH_2CH_2CH_2SO_3Na$), 32.36 ($OCH_2CH_2CH_2CH_2Si$), 29.94 ($SiCH_2CH_2S$), 26.86 ($SCH_2CH_2CH_2SO_3Na$), 24.23 ($SCH_2CH_2CH_2SO_3Na$), 19.36 ($OCH_2CH_2CH_2CH_2Si$), 14.03 ($SiCH_2CH_2S$), 12.72 ($OCH_2CH_2CH_2CH_2Si$), -5.72 (Si*Me*). **^{29}Si-RMN** (D_2O): δ 2.10 (*Si*$MeCH_2CH_2S$), 1.00 (*Si*$MeCH_2CH_2CH_2Si$). **Elemental Analysis:** Calc. %: C, 37.07; H, 5.86; S, 23.29; Exp

%: C, 38.18; H, 6.42; S, 22.74.

$G_3O_3[S(CH_2)_3(SO_3Na)_{24}]$ (6). $C_{213}H_{438}Na_{24}O_{75}S_{48}Si_{21}$ (6880.38). White powder solid (0.36 g, 53%). **Reagents:** $G_3O_3V_{24}$ (0.26 g, 0.10 mmol), sodium 3-mercapto-1-propanesulfonate (0.53 g, 2.43 mmol), DMPA (0.06 g, 0.24 mmol). **^{1}H-NMR** (D_2O): δ 6.03 (3 H, s, Ar*H*), 3.90 (6 H, t, C*H*$_2$O), 2.99 (48 H, t, $SCH_2CH_2CH_2SO_3Na$), 2.68 (96 H, m, $SiCH_2CH_2S$, $SCH_2CH_2CH_2SO_3Na$), 2.03 (48 H, m, $SCH_2CH_2CH_2SO_3Na$), 1.80 (6 H, m, $OCH_2CH_2CH_2CH_2Si$), 1.41 (36 H, m, $SiCH_2CH_2CH_2Si$), 0.96 (48 H, t, $SiCH_2CH_2S$), 0.66 (72 H, m, $SiCH_2CH_2CH_2Si$), 0.10 (36 H, s, Si*Me*CH_2CH_2S), 0.01 (27 H, s, Si*Me*). **^{13}C-NMR** (D_2O): δ 67.53 (OCH_2), 50.12 ($SCH_2CH_2CH_2SO_3Na$), 30.16 ($SiCH_2CH_2S$), 27.36 ($SCH_2CH_2CH_2SO_3Na$), 24.34 ($SCH_2CH_2CH_2SO_3Na$), 18.52 ($SiCH_2CH_2CH_2Si$), 14.33 ($SiCH_2CH_2S$, $SiCH_2CH_2CH_2Si$),-4.58 (Si*Me*), -5.48 (Si*Me*CH_2CH_2S). **^{29}Si-RMN** (D_2O): δ 2.10 (*Si*$MeCH_2CH_2S$), 1.00 (*Si*$MeCH_2CH_2CH_2Si$). **Elemental Analysis:** Calc. %: C, 37.18; H, 6.42; S, 22.37; Exp %: C, 36.99; H, 6.24; S, 23.41.

Synthesis of compounds $G_nSi[(SCH_2CO_2Me)_m]$ (7-9) and $G_nO_3[(SCH_2CO_2Me)_m]$ (10-12)

General method: To a THF/MeOH (3:1) solution of precursor dendrimers the stequiometric amount of commercial $HSCH_2COOCH_3$ 97% is added. The mixtures are deoxygenized with argon. Reactions are stirred for 4 hours under an UV lamp with λmax= 364 nm. After this time, solvent is removed under vacuum. The desired products are obtained as transparent, sulphur smelly oils.

$G_1Si[(SCH_2CO_2Me)_8]$ (7). $C_{64}H_{124}O_{16}S_8Si_5$ (1546.61). Oil (0.21 g, 90%). **Reagents:** G_1SiA_8 (0.10 g, 0.15 mmol), methyl thioglycolate (0.11 mL, 1.18 mmol). **^{1}H-NMR** ($CDCl_3$): δ 3.71 (24 H, s, $COOCH_3$), 3.19 (16 H, s, SCH_2CO), 2.61 (16 H, t,

$SiCH_2CH_2CH_2S$), 1.54 (16 H, m, $SiCH_2CH_2CH_2CH_2S$), 1.22 (8 H, m, $SiCH_2CH_2CH_2CH_2Si$), 0.54 (32 H, m, $SiCH_2CH_2CH_2Si(Me)CH_2CH_2CH_2S$), -0.06 (12 H, s, Si*Me*). **^{13}C-NMR** ($CDCl_3$): δ 170.89 ($COOCH_3$), 52.29 ($COOCH_3$), 36.33 ($SiCH_2CH_2CH_2S$), 33.32 (SCH_2COOCH_3), 23.62 ($SiCH_2CH_2CH_2S$), 13.28 ($SiCH_2CH_2CH_2S$), 18.62-18.40 ($SiCH_2CH_2CH_2Si$), 17.84 ($SiCH_2CH_2CH_2Si$), -5.32 (Si*Me*). **^{29}Si-NMR** ($CDCl_3$): δ 2.69 ($SiMeCH_2CH_2CH_2S$), 0.81 ($SiCH_2CH_2CH_2SiMe$). **Elemental Analysis:** Calc. %: C, 49.70; H, 8.08; S, 16.59; Exp %: C, 49.70; H, 8.08; S, 16.74. **ESI-MS:** $[M+2(NH_4)]^{+2}$= 790.31; $[M+(NH_4)]^{+}$= 1564.58.

$G_3Si[(SCH_2CO_2Me)_{32}]$ (9). $C_{304}H_{604}O_{32}S_{16}Si_{13}$ (7124.57). Oil (0.28 g, 57%). **Reagents:** G_3SiA_{32} (0.27 g, 0.007 mmol), methyl thioglycolate (0.23 mL, 2.35 mmol). **^{1}H-NMR** ($CDCl_3$): δ 3.68 (96 H, s, $COOCH_3$), 3.17 (64 H, s, SCH_2CO), 2.59 (64 H, t, $SiCH_2CH_2CH_2S$), 1.53 (64 H, m, $SiCH_2CH_2CH_2S$), 1.23 (56 H, m, $SiCH_2CH_2CH_2Si$), 0.53 (176 H, m, $SiCH_2CH_2CH_2Si(Me)CH_2CH_2CH_2S$), -0.08 (48 H, s, $SiMeCH_2CH_2CH_2S$), -0.12 (36 H, s, $SiCH_2CH_2CH_2SiMe$). **^{13}C-NMR** ($CDCl_3$): δ 170.91 ($COOCH_3$), 52.29 ($COOCH_3$), 36.33 ($SiCH_2CH_2CH_2S$), 33.32 (SCH_2COOCH_3), 23.66 ($SiCH_2CH_2CH_2S$), 13.29 ($SiCH_2CH_2CH_2S$), 18.83-18.38 ($SiCH_2CH_2CH_2Si$, $SiCH_2CH_2CH_2Si$), -5.24 (Si*Me*). **^{29}Si-NMR** ($CDCl_3$): δ 2.69 ($SiMeCH_2CH_2CH_2S$), 0.81 ($SiCH_2CH_2CH_2SiMe$). **Elemental Analysis:** Calc. %: C, 51.25; H, 8.55; S, 14.40; Exp %: C, 52.13; H, 8.25; S, 14.91.

$G_1O_3[(SCH_2CO_2Me)_6]$ (10). $C_{51}H_{90}O_{15}S_6Si_3$ (1219.90). Oil (0.63 g, 85%). **Reagents:** $G_1O_3V_6$ (0.35 g, 0.61 mmol), methyl thioglycolate (0.36 mL, 3.64 mmol). **^{1}H-NMR** ($CDCl_3$): δ 6.01 (3 H, s, Ar-*H*), 3,87 (6 H, t, CH_2O-Ar), 3.68 (18 H, s, $COOCH_3$), 3.20 (12 H, s, SCH_2CO), 2.63 (12 H, t, $SiCH_2CH_2S$), 1.74 (6 H, t, $OCH_2CH_2CH_2CH_2Si$), 1.42 (6 H, t, $OCH_2CH_2CH_2CH_2Si$), 0.88 (12 H, m, $SiCH_2CH_2S$), 0.58 (6 H, t, $OCH_2CH_2CH_2CH_2Si$), 0.01 (9 H, s, Si*Me*). **^{13}C-NMR** ($CDCl_3$): δ 170.75 ($COOCH_3$),

160.69 (C_{ipso}), 93.54 (Ar*C*), 67.14 (O*C*H_2), 52.18 (COO*C*H_3), 33.05 (S*C*H_2COOCH_3), 32.77 (OCH_2*C*H_2CH_2CH_2Si), 27.94 (SiCH_2*C*H_2S), 20.08 (OCH_2CH_2*C*H_2CH_2Si), 13.62 (Si*C*H_2CH_2S), 13.04 (OCH_2CH_2CH_2*C*H_2Si), -5.56 (Si*Me*). **^{29}Si-RMN** (D_2O): δ 2.40 (*Si*MeCH_2CH_2S), 1.71 (*Si*MeCH_2CH_2CH_2Si). **Elemental Analysis:** Calc. %: C, 50.21; H, 7.44; S, 15.77; Exp %: C, 50.07; H, 7.43; S, 14.86. **ESI-MS:** $[M+(NH_4)]^+$= 1236.42.

$G_3O_3[(SCH_2CO_2Me)_{24}]$ (12). $C_{213}H_{414}O_{51}S_{24}Si_{21}$ (5150.89). Oil (0.42 g, 73%). **Reagents:** $G_3O_3V_{24}$ (0.29 g, 0.11 mmol), methyl thioglycolate (0.23 mL, 2.66 mmol). **^{1}H-NMR** ($CDCl_3$): δ 6.01 (3 H, s, Ar-*H*), - (6 H, t, C*H*$_2$O-Ar), 3.70 (72 H, s, COOC*H*$_3$), 3.21 (48 H, s, SC*H*$_2$CO), 2.63 (48 H, t, SiCH_2C*H*$_2$S), 1.78 (6 H, m, OCH_2C*H*$_2$CH_2CH_2Si), 1.23 (42 H, m, OCH_2CH_2C*H*$_2$CH_2Si, SiCH_2C*H*$_2$CH_2Si), 0.87 (48 H, m, SiC*H*$_2$CH_2S), 0.51 (78 H, m, OCH_2CH_2CH_2C*H*$_2$Si, SiC*H*$_2$CH_2C*H*$_2$Si), 0.01 (36 H, s, Si*Me*CH_2CH_2S), -0.10 (27 H, s, Si*Me*). **^{13}C-NMR** ($CDCl_3$): δ 170.80 (*C*OOCH_3), 52.24 (COO*C*H_3), 33.16 (S*C*H_2COOCH_3), 28.09 (SiCH_2*C*H_2S), - (OCH_2CH_2*C*H_2CH_2Si), 18.70 (Si*C*H_2CH_2*C*H_2Si), 18.21 (SiCH_2*C*H_2CH_2Si), 13.81 (Si*C*H_2CH_2S), -5.15 (Si*Me*), -5.43 (Si*Me*CH_2CH_2S). **^{29}Si-RMN** (D_2O): δ 2.40 (*Si*MeCH_2CH_2S), 1.71 (*Si*MeCH_2CH_2CH_2Si). **Elemental analysis:** Calc. %: C, 49.67; H, 8.10; S, 14.94; Exp %: C, 52.13; H, 8.25; S, 14.91.

Synthesis of compounds $G_nSi[(SCH_2CO_2Na)_m]$ (13-15) and $G_nO_3[(SCH_2CO_2Na)_m]$ (16-18)

General method: To MeOH solutions of products **7-12** excess of NaOH is added and the mixtures are stirred at room temperature for 12 hours. After this time, solvent is removed under vacuum and the products are purified by nanofiltration with cellulose acetate membrane of MWCO=500-1000. Water is removed under vacuum and the desired products are obtained as white powders.

$G_1Si[(SCH_2CO_2Na)_8]$ (13). $C_{56}H_{100}Na_8O_{16}S_8Si_5$ (1610.25). White solid powder (0.16 g, 63%). **Reagents: 7** (0.14 g, 0.09 mmol), NaOH (0.086 g, 2.16 mmol). **^{1}H-NMR** (D_2O): δ 3.25 (16 H, s, SC*H*$_2$CO), 2.62 (16 H, t, SiCH$_2$CH$_2$C*H*$_2$S), 1.63 (16 H, m, SiCH$_2$C*H*$_2$CH$_2$S), 1.42 (8 H, m, SiCH$_2$C*H*$_2$CH$_2$Si), 0.66 (32 H, m, SiC*H*$_2$CH$_2$C*H*$_2$Si(Me)C*H*$_2$CH$_2$CH$_2$S), 0.04 (12 H, s, Si*Me*). **^{13}C-NMR** (D_2O): δ 177.49 (*C*O), 36.18 (S*C*H$_2$CO), 35.89 (SiCH$_2$CH$_2$*C*H$_2$S), 23.52 (SiCH$_2$*C*H$_2$CH$_2$S), 18.73-18.66 (SiCH$_2$*C*H$_2$CH$_2$S, Si*C*H$_2$CH$_2$*C*H$_2$Si), 17.53 (SiCH$_2$*C*H$_2$CH$_2$Si), 13.05 (Si*C*H$_2$CH$_2$CH$_2$S), -5.19 (Si*Me*). **NMR-^{29}Si** (D_2O): δ 2.58 (*Si*MeCH$_2$CH$_2$CH$_2$S), 1.10 (*Si*CH$_2$CH$_2$CH$_2$*Si*Me). **Elemental Analysis:** Calc. %: C, 41.77; H, 6.26; S, 15.93; Exp %: C, 41.47; H, 6.70; S, 15.60.

$G_3Si[(SCH_2CO_2Na)_{32}]$ (15). $C_{272}H_{508}Na_{32}O_{64}S_{32}Si_{29}$ (7379.14). White solid powder (0.24 g, 83%). **Reagents: 9** (0.25 g, 0.03 mmol), NaOH (0.11 g, 2.88 mmol). **^{1}H-NMR** (D_2O): δ 3.22 (64 H, s, SC*H*$_2$CO), 2.60 (64 H, t, SiCH$_2$CH$_2$C*H*$_2$S), 1.63 (64 H, m, SiCH$_2$C*H*$_2$CH$_2$S), 1.40 (56 H, m, SiCH$_2$C*H*$_2$CH$_2$Si), 0.65 (176 H, m, SiC*H*$_2$CH$_2$C*H*$_2$Si(Me)C*H*$_2$CH$_2$CH$_2$S), 0.04 (84 H, s, Si*Me*). **^{13}C-NMR** (D_2O): δ 176.94 (*C*O), 36.05 (S*C*H$_2$CO), 35.02 (SiCH$_2$CH$_2$*C*H$_2$S), 22.69 (SiCH$_2$*C*H$_2$CH$_2$S), 17.65 (SiCH$_2$*C*H$_2$CH$_2$S, Si*C*H$_2$CH$_2$*C*H$_2$Si, SiCH$_2$*C*H$_2$CH$_2$Si), 12.22 (Si*C*H$_2$CH$_2$CH$_2$S), -5.28 (Si*Me*), -5.88 (Si*Me*CH$_2$CH$_2$CH$_2$S). **NMR-^{29}Si** (D_2O): δ 2.58 (*Si*MeCH$_2$CH$_2$CH$_2$S), 1.10 (*Si*CH$_2$CH$_2$CH$_2$*Si*Me). **Elemental Analysis:** Calc. %: C, 44.27; H, 6.94; S, 13.91 Exp %: C, 44.14; H, 7.06; S, 15.92.

$G_1O_3[(SCH_2CO_2Na)_6]$ (16). $C_{45}H_{72}Na_6O_{15}S_6Si_3$ (1267.63). White solid powder (0.35 g, 54%). **Reagents: 10** (0.61 g, 0.5 mmol), NaOH (0.36 g, 9 mmol). **^{1}H-NMR** (D_2O): δ 6.20 (3 H, s, Ar-*H*), 3.99 (6 H, t, C*H*$_2$O), 3.18 (12 H, s, SC*H*$_2$CO), 2.58 (12 H, t, SiCH$_2$C*H*$_2$S), 1.73 (6 H, m, OCH$_2$C*H*$_2$CH$_2$CH$_2$Si), 1.41 (6 H, m, OCH$_2$CH$_2$C*H*$_2$CH$_2$Si), 0.88 (12 H, m, SiC*H*$_2$CH$_2$S), 0.58 (6 H, m, OCH$_2$CH$_2$CH$_2$C*H*$_2$Si), -0.01 (9 H, s, Si*Me*).

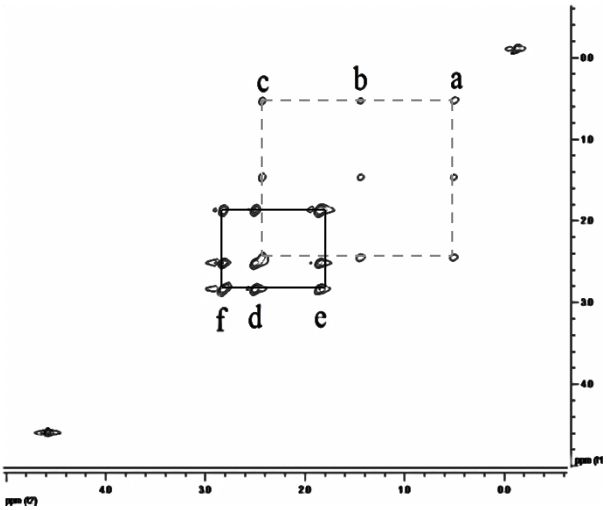
^{13}C-NMR (D_2O): δ 177.08 (*C*O), 159.20 (C_{ipso}), 93.93 (Ar*C*), 67.03 (O*C*H_2), 35.62 (S*C*H_2CO), 30.94 (OCH$_2$*C*H$_2$CH$_2$CH$_2$Si), 26.62 (SiCH$_2$*C*H$_2$S), 18.66 (OCH$_2$CH$_2$*C*H$_2$CH$_2$Si), 12.55 (Si*C*H$_2$CH$_2$S), 11.23 (OCH$_2$CH$_2$CH$_2$*C*H$_2$Si), -7.11 (Si*Me*). **NMR-^{29}Si** (D_2O): δ 2.10 (*Si*MeCH$_2$CH$_2$S), 1.70 (*Si*CH$_2$CH$_2$CH$_2$*Si*Me). **Elemental Analysis:** Calc. %: C, 42.64; H, 5.72; S, 15.18; Exp %: C, 40.05; H, 5.98; S, 13.27.

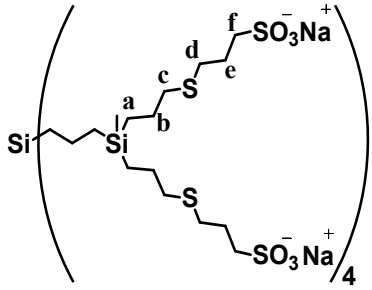
G_3O_3[(SCH$_2$CO$_2$Na)$_{24}$] (18). $C_{189}H_{342}Na_{24}O_{51}S_{24}Si_{21}$ (5341.82). White solid powder (0.33 g, 78%). **Reagents: 12** (0.41 g, 0.08 mmol), NaOH (0.22 g, 5.5 mmol). **^{1}H-NMR** (D_2O): δ 5.93 (3 H, s, Ar-*H*), 3.77 (6 H, t, C*H*$_2$O), 3.25 (48 H, s, SC*H*$_2$CO), 2.69 (48 H, t, SiCH$_2$C*H*$_2$S), 1.69 (6 H, m, OCH$_2$C*H*$_2$CH$_2$CH$_2$Si), 1.40 (42 H, m, OCH$_2$CH$_2$C*H*$_2$CH$_2$Si, SiCH$_2$C*H*$_2$CH$_2$Si), 0.95 (48 H, m, SiC*H*$_2$CH$_2$S), 0.65 (78 H, m, OCH$_2$CH$_2$CH$_2$C*H*$_2$Si, SiC*H*$_2$CH$_2$C*H*$_2$Si), 0.09 (36 H, s, Si*Me*CH$_2$CH$_2$S), 0.00 (27 H, s, Si*Me*). **^{13}C-NMR** (D_2O): δ 177.96 (*C*O), 36.88 (S*C*H$_2$CO), 27.78 (SiCH$_2$*C*H$_2$S), 18.60 (SiCH$_2$*C*H$_2$CH$_2$Si), 18.39 (Si*C*H$_2$CH$_2$*C*H$_2$Si), 13.95 (Si*C*H$_2$CH$_2$S), -4.55 (Si*Me*CH$_2$CH$_2$S), -5.38 (Si*Me*). **NMR-^{29}Si** (D_2O): δ 2.10 (*Si*MeCH$_2$CH$_2$S), 1.70 (*Si*CH$_2$CH$_2$CH$_2$*Si*Me). **Elemental Analysis:** Calc. %: C, 42.50; H, 6.45; S, 14.41; Exp %: C, 41.25; H, 6.81; S, 12.44.

NMR spectra

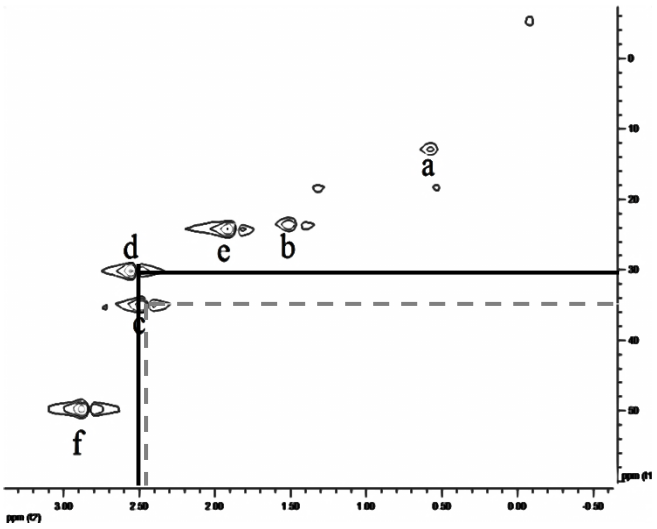
A selection of NMR spectra for first generation dendrimers with silicon or 1,3,5-trihidroxybenze core is shown.

Dendrimer 1



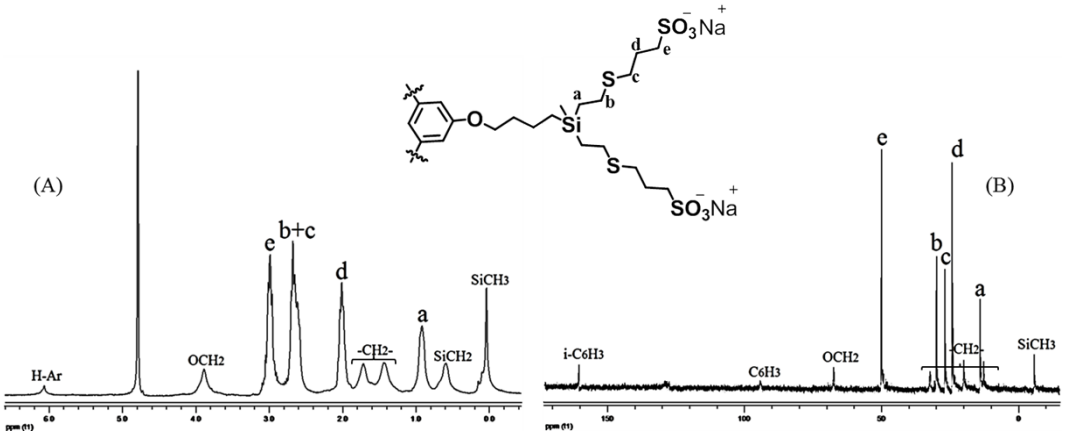


TOCSY-^{1}H-^{1}H (D_2O) spectrum



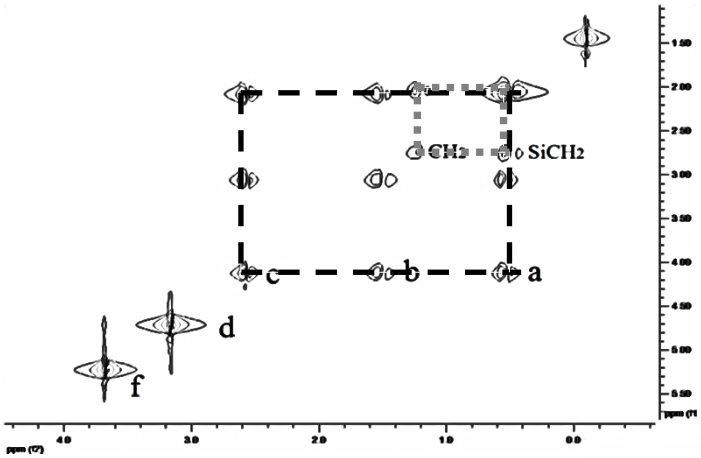
HSQC-^{1}H-^{13}C (D_2O) spectrum

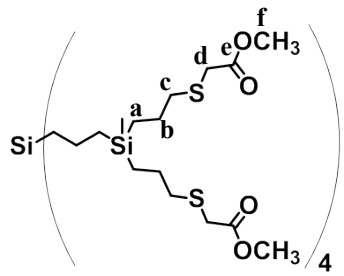
Dendrimer 4



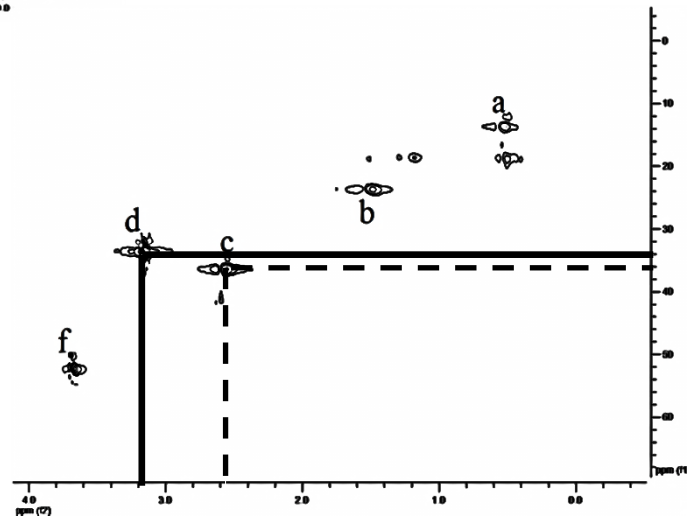
(A) NMR-^{1}H (D_2O) and (B) NMR-^{13}C (D_2O) spectra

Dendrimer 7



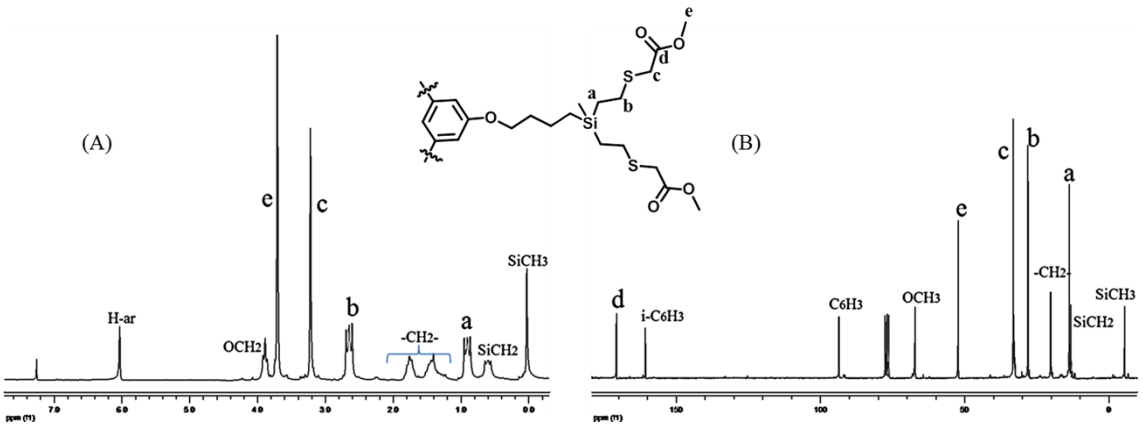


TOCSY-^{1}H-^{1}H ($CDCl_3$) spectrum



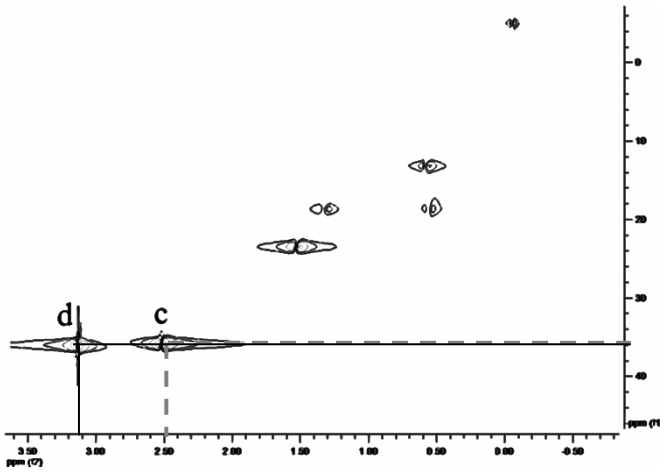
HSQC-^{1}H-^{13}C ($CDCl_3$) spectrum

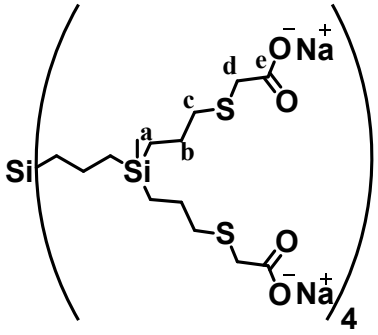
Dendrimer 10



(A) NMR-^{1}H ($CDCl_3$) and (B) NMR-^{13}C ($CDCl_3$) spectra

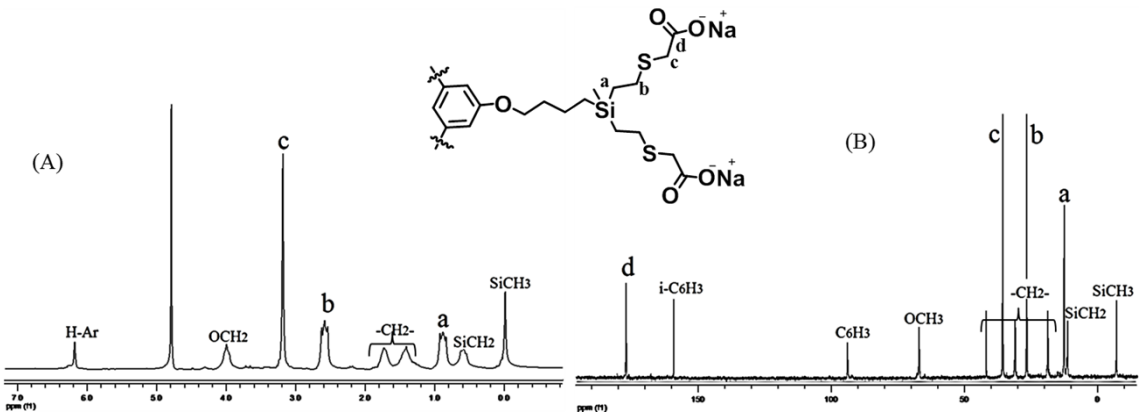
Dendrimer 13





HSQC-^{1}H-^{13}C (D_2O) spectrum

Dendrimer 16



(A) NMR-^{1}H (D_2O) and (B) NMR-^{13}C (D_2O) spectra

Molecular Modeling

Interactions with Na+ ions

The interactions with ions may influence dendrimer conformations, dendrimer size (especially in case of flexible structures) and surface electrostatic potential. Dendrimers are negatively charged with the net charge -16 in case of Si core and -12 in case of polyphenol core interacting favourably with Na^+ ions as well as with the polar water molecules. From the Na^+ density profiles respect to dendrimer core (see Figure 6D) one can recognize that CO_2 groups interact with Na+ ions strongly than SO_3 groups, being this fact even much more evident in case of Na+ density profiles with respect to terminal oxygens (see Figure 6E).

The explanation of this phenomenon is partly clear from Figure 7. The differences are determined by the differences in electrostatic potential around these groups. While in case of carboxyl group the negative electrostatic potential for stable accommodation of Na+ ion is available between both oxygen atoms (see Figure 7 A and D), in case of sulfonate group the most favourable position for Na+ ion is just near one oxygen atom on the "extension" of the S-O bond (see figure 7 B, C, and E) or in position slightly shifted from the S-O direction due to the sharing of the given SO_3 oxygen atom with some water molecule (see Figure SI 3 and SI 4).

The particular effect on the stability of the Na+ ions near the terminal group might have also permanent competition with water molecules. The Na+ ion which is associated with CO_2 group does not prevent water molecules from the favorable interaction with terminal oxygens via hydrogen bonds, while in case of SO_3 groups the associated Na+ ion clearly fully or partly prevents H_2O molecules from the favorable interaction with SO_3 oxygen occupied by that Na+ ion.

To complement radial density distribution results, the lifetimes of associated $Na+/O_{terminal}$ pairs were analyzed and these results were as follow: **14** (0.228 ns/2.300

ns), **2** (0.099 ns/0.690 ns), **17** (0.258 ns/2.12 ns), **5** (0.103 ns/0.590 ns) where the number before and after the slash are the average lifetime and the maximal value detected from the last 50 ns of the simulation respectively, correlating well with radial density distribution results.

This different behavior respecting to the interaction with Na^+ cations or even water molecules would mean that carboxylated structures will be more influenced by these interactions and e.g. the size differences, differences in SASA or the CV parameter (see Table 1) might be partly attributed to a better "neutralization" and "glueing" effect of the Na+ ions in case of carboxylated surfaces bringing a slightly more compact and smoother surface, smaller molecular size and higher stability than the corresponding sulfonate dendrimers.

CV values

The CV value reported in Table 1 for each dendrimer type is an average from RMSD values calculated for each pair of structures which could be chosen from the set of 5000 molecular configurations ($\binom{5000}{2}$ = 124 995 000 pairs) sampled during the last 50ns of the total 150ns long simulation. This also means that we can consider the CV values reported in Table 1 as sufficiently representative characteristic**.** The structures reported in Figure 5 were identified as the most characteristic/representative ones in situation where we consider subdivision of the 5000 above mentioned molecular configurations into 5 distinct subsets based again on RMSD "distance". Representativeness of any molecular conformation X_i within the given subset C_k containing N_k molecular

conformations increases as its average RMSD distance $D_i = \frac{\sum_{j=1, j\neq i}^{N_k} RMSD_{ij}}{N_k}$ to all remaining configurations X_j decreases. So each representative structure R_k in figure Figure 5 has on its subset C_k the smallest D value. The statistical relevance of each such representant R_k within the whole set of 5000 sampled conformations might be of course defined as the ratio $\frac{N_k}{5000}$ and exactly these numbers are reported in Figure 5. For this clustering analysis the bottom-up (agglomerative) hierarchical algorithm was used as implemented in *cluster* function of the Amber12 software (see Computational details section for the reference).

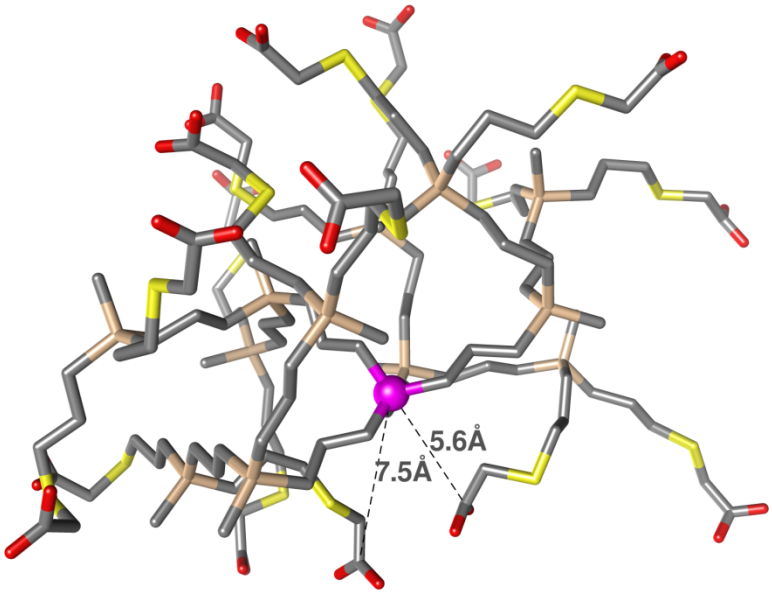
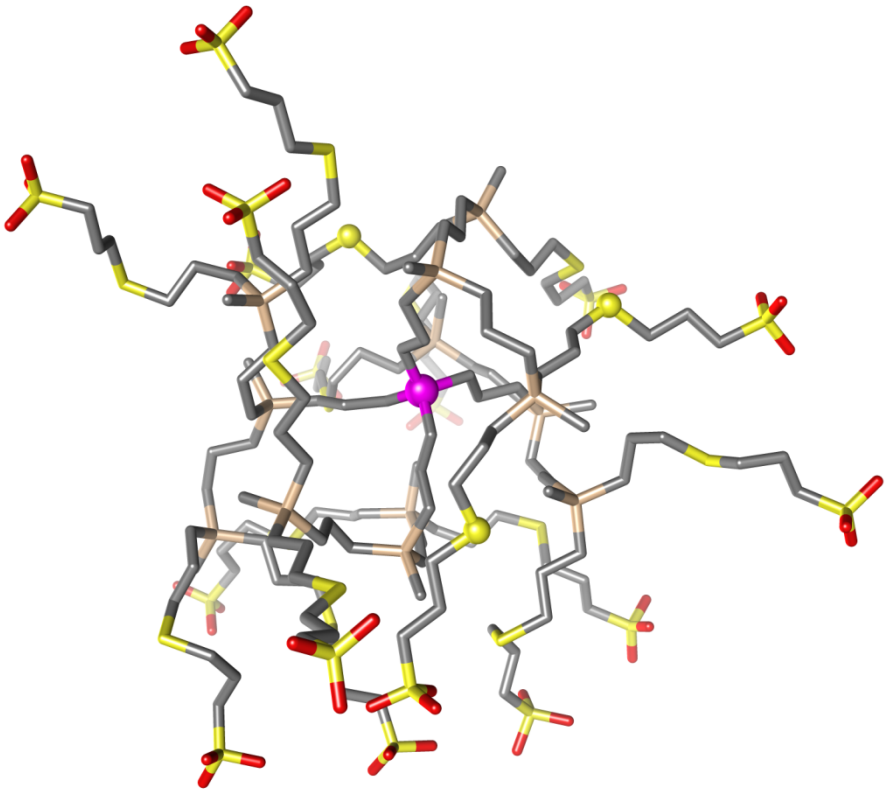


Figure SI 1. Computer model of dendrimer 14. The most representative conformation from the last 50 ns of



simulation is shown. Hydrogen atoms are omitted for the better clarity. The color coding for all remaining atoms is: C – grey, O – red, Si – beige (core Si atom is in magenta), S – yellow.

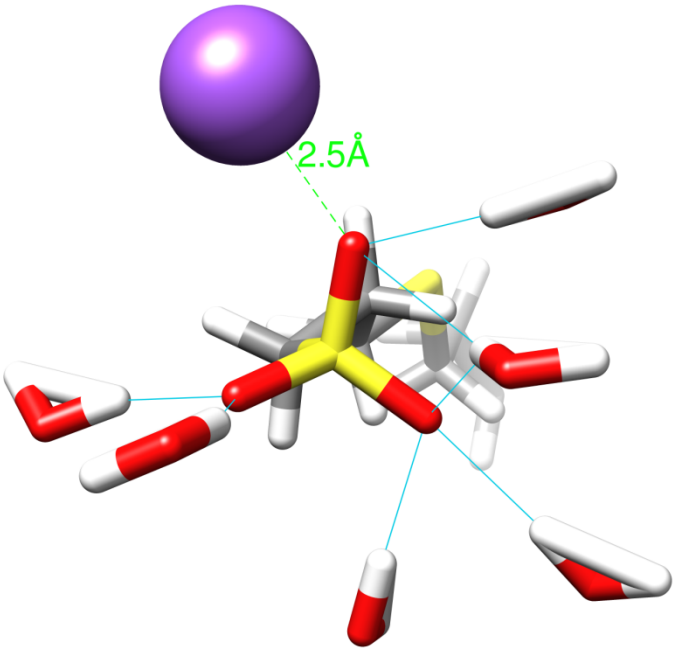


Figure SI 2. Computer model of dendrimer 2. The most representative conformation from the last 50ns of simulation is shown. Hydrogen atoms are omitted for the better clarity. The nonterminal sulfur atoms (around 7.5 Å from core Si atom) of partially backfolded branches are in ball representation. The color coding is the same as in Figure SI 1

Figure SI 3. Common position of the Na+ cation (purple) relative to SO_3 group. The cyan lines denote H-bonds and the green dashed lines together with the green numbers denotes O…Na+ distance.

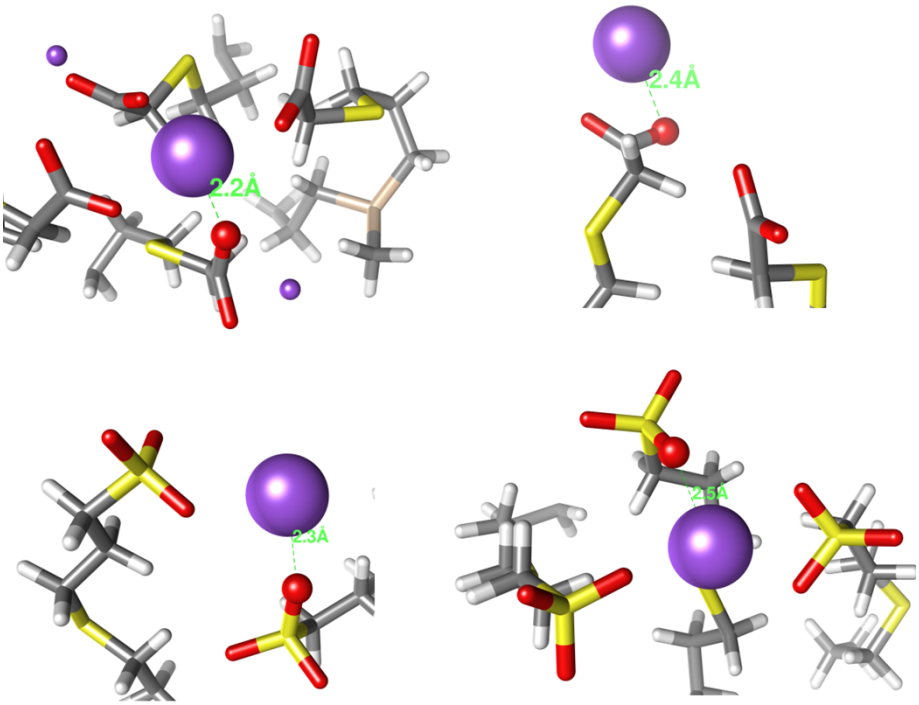


Figure SI 4. Illustration of the $Na^+/O_{terminal}$ interactions with the longest lifetime. The relevant $Na^+/O_{terminal}$ pairs of the interest are highlighted (O … ball and Na+ … sphere representations) and the relevant distance is reported (green numbers). The 14 (association lifetime 2.300 ns) TOP and 2 (association lifetime 0.690 ns) BOTTOM. For both structures the two snaps are shown. One from the start of the binding period (LEFT) and one from the final stage of the binding period (RIGHT).

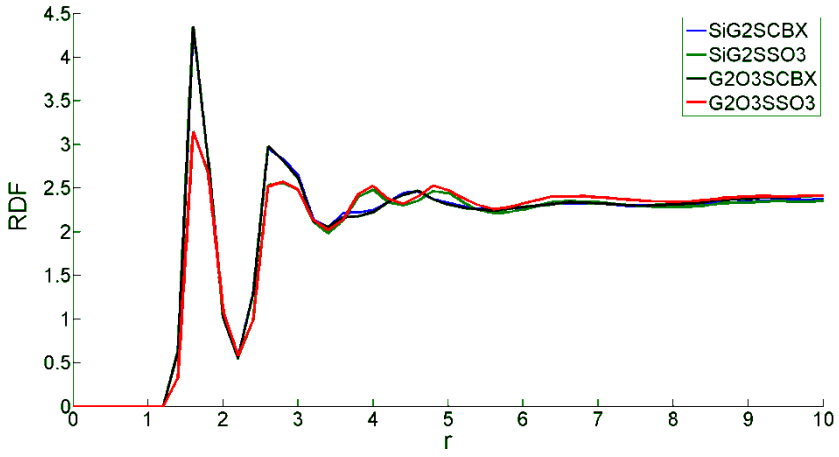


Figure SI 5. Radial distribution density profiles of water atoms with respect to dendrimer terminal oxygen atoms.

Biomedical essays

	14 LD* 2h	14 HD* 2h	14 LD* 24h	14 HD* 24h	Vehicle
Epithelium (0-4)†	1.33 ± 1.53	0	0	0.33 ± 0.58	0
Leukocyte infiltration (0-4)†	0	0.33 ± 0.58	0	0	0.33 ± 0.58
Vascular congestion (0-4)†	0.33 ± 0.58	0	0.33 ± 0.58	0	0
Oedema (0-4)†	0	0	0	1 ± 1.73	0
Microscopic irritation Score#	1.7	0.3	0.3	1.3	0.3
Vaginal irritation index (0-16)¥	1.7	0.3	0.3	1.3	0

	2 LD* 2h	2 HD* 2h	2 LD* 24h	2 HD* 24h	Vehicle
Epithelium (0-4)†	1 ± 1	0.67 ± 1.15	1 ± 1.73	1.33 ± 0.58	0
Leukocyte infiltration (0-4)†	0	0	0.33 ± 0.58	0	0.33 ± 0.58
Vascular congestion (0-4)†	0	0	0	0	0
Oedema (0-4)†	0.33 ± 0.58	1.67 ± 1.15	1.33 ± 1.53	1.67 ± 1.15	0
Microscopic irritation Score#	1.33	2.33	2.7	3,0	0.33
Vaginal irritation index (0-16)¥	1	2	2.3	2.67	0

Table SI 1. Vaginal irritation index obtained in nine groups of CD-1 (ICR) strain mice treated vaginally during 2 or 24 hours. Vehicle control represents PBS. **2** LD and **14** LD (Low Dose, 10 µM), **2** HD and **14** (High Dose, 100 µM). * Mean ± SD. † Values were calculated as the mean of the scores estimated at the cervicovagina, midvagina and urovagina of the 3 mice in each group. Grading system for microscopic examination of vaginal tissue reaction (ISO 10993-10) with scores from = (normal parameter or absent adverse effects) to 4 (most severe adverse findings) was used. The final score is then expressed as mean ± standard deviation of 9 determinations. # Microscopic irritation score corresponds to the addition of the scores of epithelium irritation, leucocytes infiltration, vascular congestion and oedema, in accordance with the requirements of the ISO 10993-10 standard. ¥ The average obtained for the negative control group was subtracted from the evaluated articles to determine the vaginal irritation index. The correlations with human irritation potential are as follows. Vaginal irritation index < 8: Acceptable; 9-10: Marginal; and ≥ 11: Unacceptable, according to Eckstein *et al.* (see reference Eckstein P, Jackson MC, Millman N, Sobrero AJ: Comparison of vaginal tolerance tests of spermicidal preparations in rabbits and monkeys. *J Reprod Fertil* **1969**, 20(1):85-93).