**SUPPLEMENTARY MATERIAL**

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**Effect of hydrophile–lipophile balance of *F*-Alkylated cyclic polyethylene glycol succinates on their applications**

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**Spectroscopic data**

**Monotail surfactants (1)**

*Triethyleneglycol 2-(octylsulfanyl)butanedioate (R: C6H13, n = 1). Yield: 94%. Eluent of purification CH2Cl2/CH3OH: 98/.*

1H NMR (CDCl3): (ppm) 0.89 (t, 3H, CH3CH2), 1.27 (s, 10H, CH3(CH2)5), 1.60 (m, 2H, CH2CH2S), 2.68 (m, 2H, CH2CH2S), 2.68–3.10 (m, 2H, O2CCH2CH), 3.57–3.75 (m, 8H, CH2(CH2OCH2)2CH2), 3.73 (m, 1H, SCHCO2), 4.05–4.35 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 14.08 (s, 1C, CH3CH2), 28.80 (s, 1C, CH3CH2), 29.11 (s, 1C, CH3CH2CH2), 29.12 (s, 1C, CH3(CH2)2CH2), 29.18 (s, 1C, CH3(CH2)3CH2), 29.31 (s, 1C, CH2CH2CH2S), 29.68 (s, 1C, CH2CH2S), 22.62 (s, 1C, O2CCH2CH), 36.88 (s, 1C, CH2CH2S), 41.72 (s, 1C, SCHCO2), 63.86, 64.52, 68.71, 68.91 (4s, 4C, CH2(CH2OCH2)2CH2), 69.49, 69.81 (s, 2C, 2CO2CH2), 169.81, 170.81 (s, 2C, 2CO2).

*Tetraethyleneglycol 2-(octylsulfanyl)butanedioate (R: C6H13, n = 2). Yield: 91%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 0.89 (t, 3H, CH3CH2), 1.27 (s, 10H, CH3(CH2)5), 1.60 (m, 2H, CH2CH2S), 2.68 (m, 2H, CH2S), 2.68–3.10 (m, 2H, O2CCH2CH), 3.62–3.78 (m, 12H, CH2(CH2OCH2)3CH2), 3.73 (m, 1H, SCHCO2), 4.06–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 14.08 (s, 1C, CH3CH2), 28.80 (s, 1C, CH3CH2), 29.11 (s, 1C, CH3CH2CH2), 29.12 (s, 1C, CH3(CH2)2CH2), 29.18 (s, 1C, CH3(CH2)3CH2), 29.31 (s, 1C, CH2CH2CH2S), 29.68 (s, 1C, CH2CH2S), 31.63 (s, 1C, CH2CH2S), 22.62 (s, 1C, O2CCH2CH), 41.72 (s, 1C, SCHCO2), 64.26, 64.94, 68.81, 68.95, 70.59, 70.72 (6s, 6C, CH2(CH2OCH2)3CH2), 70.02, 70.90 (s, 2C, 2CO2CH2) 170.24, 171.20 (s, 2C, 2CO2).

*Pentaethyleneglycol 2-(Octylsulfanyl)butanedioate (R: C6H13, n = 3). Yield: 90%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 0.89 (t, 3H, CH3CH2), 1.27 (s, 10H, CH3(CH2)5), 1.60 (m, 2H, CH2CH2S), 2.68 (m, 2H, CH2CH2S), 2.68–3.10 (m, 2H, O2CCH2CH), 3.62–3.65 (m, 16H, CH2(CH2OCH2)4CH2), 3.73 (m, 1H, SCHCO2), 4.20–4.45 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 14.08 (s, 1C, CH3CH2), 28.82 (s, 1C, CH3CH2), 29.14 (s, 1C, CH3CH2CH2), 29.15 (s, 1C, CH3(CH2)2CH2), 29.18 (s, 1C, CH3(CH2)3CH2), 29.31 (s, 1C, CH2CH2CH2S), 29.68 (s, 1C, CH2CH2S), 36.88 (s, 1C, CH2CH2S), 22.64 (s, 1C, O2CCH2CH), 41.72 (s, 1C, SCHCO2), 64.22, 64.82, 68.84, 68.78, 70.11, 70.60, 70.65, 70.83 (8s, 8C, CH2(CH2OCH2)4CH2), 70.92, 71.07 (s, 2C, 2CO2CH2), 170.40, 171.64 (s, 2C, 2CO2).

*Hexaethyleneglycol 2-(octylsulfanyl)butanedioate (R: C6H13, n = 4). Yield: 88%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 0.89 (t, 3H, CH3CH2), 1.27 (s, 10H, CH3(CH2)5), 1.60 (m, 2H, CH2CH2S), 2.68 (m, 2H, CH2CH2S), 2.68–3.10 (m, 2H, O2CCH2CH), 3.62–3.71 (m, 20H, CH2(CH2OCH2)5CH2), 3.73 (m, 1H, SCHCO2), 4.08–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 14.08 (s, 1C, CH3CH2), 28.82 (s, 1C, CH3CH2), 29.14 (s, 1C, CH3CH2CH2), 29.16 (s, 1C, CH3(CH2)2CH2), 29.18 (s, 1C, CH3(CH2)3CH2), 29.31 (s, 1C, CH2CH2CH2S), 29.68 (s, 1C, CH2CH2S), 36.88 (s, 1C, CH2CH2S), 22.72 (s, 1C, O2CCH2CH), 41.72 (s, 1C, SCHCO2), 70.87, 70.90 (s, 2C, 2CO2CH2), 64.45, 64.73, 64.99, 68.90, 68.98, 70.64, 70.75, 70.78, 70.79, 70.80 (10s, 10C, CH2(CH2OCH2)5CH2), 70.87, 70.90 (s, 2C, 2CO2CH2), 170.80, 171.46 (s, 2C, 2CO2).

*Triethyleneglycol 2-[2-(F-hexyl)ethylsulfanyl]butanedioate (R: C6F13, n = 1). Yield: 92%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3) (ppm) 2.41 (m, 2H, CF2CH2), 2.91 (m, 2H, CH2CH2S), 2.81–3.11(m, 2H, O2CCH2CH), 3.57–3.75 (m, 8H, CH2(CH2OCH2)2CH2), 3.75 (m, 1H, SCHCO2), 4.20–4.50 (m, 4H, 2CO2CH2).

13C NMR (CDCl3) (ppm) 22.59 (s, 1C, O2CCH2CH), 31.72 (t, 1C, CF2CH2), 36.49 (s, 1C, CH2CH2S), 41.72 (s, 1C, SCHCO2), 63.86, 64.52, 68.71, 68.91 (4s, 4C, CH2(CH2OCH2)2CH2), 69.49, 69.81, (2s, 2C, 2CO2CH2), 169.85, 170.82 (2s, 2C, 2CO2). 19F NMR (CFCl3) (ppm) -80.78 (m, 3F, CF3), -115.29 (m, 2F, CF2), -122.84 (m, 2F, CF), -123.82 (m, 2F, CF), -124.29 (m, 2F, CF), -127.13 (m, 2F, CF).

*Tetraethyleneglycol 2-[2-(F-hexyl)ethylsulfanyl]butanedioate (R: C6F13, n = 2). Yield: 90%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.41 (m, 2H, CF2CH2), 2.94 (m, 2H, CH2CH2S), 2.77–3.15 (m, 2H, O2CCH2CH), 3.62–3.78 (s, 12H, CH2(CH2OCH2)3CH2), 3.78 (m, 1H, SCHCO2), 4.18–4.55 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 22.52 (s, 1C, O2CCH2CH), 31.68 (t, 1C, CF2CH2), 36.49 (s, 1C, CH2CH2S), 41.93 (s, 1C, SCHCO2), 64.26, 64.94, 68.81, 68.95, 70.59, 70.72 (6s, 6C, CH2(CH2OCH2)3CH2), 71.02, 70.90 (2s, 2C, 2CO2CH2), 169.85, 170.82 (2s, 2C, 2CO2). 19F NMR (CFCl3): (ppm) -81.69 (m, 3F, CF3), -115.12 (m, 2F, CF), -122.79 (m, 2F, CF), -123.78 (m, 2F, CF), -124.25 (m, 2F, CF), -127.04 (m, 2F, CF).

*Pentaethyleneglycol 2-[2-(F-hexyl)ethylsulfanyl]butanedioate (R: C6F13, n = 3). Yield: 89%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3):(ppm) 2.43 (m, 2H, CF2CH2), 2.93 (m, 2H, CH2CH2S), 2.75–3.12 (m, 2H, O2CCH2CH), 3.62–3.65 (m, 16H, CH2(CH2OCH2)4CH2), 3.76 (m, 1H, SCHCO2), 4.20–4.45 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 22.67 (s, 1C, O2CCH2CH), 31.90 (t, 1C, CF2CH2), 36.41 (s, 1C, CH2CH2S), 42.40 (s, 1C, SCHCO2), 64.22, 64.82, 68.84, 68.78, 70.11, 70.60, 70.65, 70.83 (8s, 8C, CH2(CH2OCH2)4CH2), 70.92, 71.07 (2s, 2C, 2CO2CH2), 169.89, 170.97 (2s, 2C, 2CO2).

19F NMR (CFCl3): (ppm) -81.79 (m, 3F, CF3), -115.23 (m, 2F, CF2a), -122.85 (m, 2F, CF), -123.83 (m, 2F, CF), -124.31 (m, 2F, CF), -127.11(m, 2F, CF).

*Hexaethyleneglycol 2-[2-(F-hexyl)ethylsulfanyl]butanedioate (R: C6F13, n = 4). Yield: 86%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.42 (m, 2H, CF2CH2), 2.94 (m, 2H, CH2CH2S), 2.74–3.11 (m, 2H, CO2CH2CH), 3.62–3.71 (m, 20H, CH2(CH2OCH2)5 CH2), 3.78 (m, 1H, SCHCO2), 4.20–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 22.60 (s, 1C, O2CCHCH2), 31.68 (t, 1C, CF2CH2), 36.32 (s, 1C, CH2CH2S), 42.25 (s, 1C, SCHCO2), 64.45, 64.73, 64.99, 68.90, 68.98, 70.64, 70.75, 70.78, 70.79, 70.84 (10s, 10C, CH2(CH2OCH2)5CH2), 70.87, 70.90 (2s, 2C, 2CO2CH2), 169.97, 170.96 (2s, 2C, 2CO2).

19F NMR (CFCl3): (ppm) -81.73 (m, 3F, CF3), -115.21 (m, 2F, CF), -122.84 (m, 2F, CF), -123.81 (m, 2F, CF), -124.29 (m, 2F, CF), -127.09 (m, 2F, CF).

*Yield: 89%. Triethyleneglycol 2-[2-(F-octyl)ethylsulfanyl]butanedioate (R: C8F17, n = 1). Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.44 (m, 2H, CF2CH2), 2.93 (m, 2H, CH2CH2S), 2.71–3.11(m, 2H, CH2CH), 3.67–3.74 (m, 8H, CH2(CH2OCH2)2CH2), 3.75 (m, 1H, SCHCO2), 4.25–4.45 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 22.54 (s, 1C, O2CCHCH2), 31.72 (t, 1C, CF2CH2), 36.49 (s, 1C, CH2CH2S), 41.72 (s, 1C, SCHCO2), 63.86, 64.52, 68.70, 68.90 (4s, 4C, CH2(CH2OCH2)2CH2), 69.49, 69.81 (2s, 2C, 2CO2CH2), 169.85, 170.82 (2s, 2C, 2CO2).

19F NMR (CFCl3): (ppm) -81.68 (m, 3F, CF3), -115.23 (m, 2F, CF), -122.61 (m, 2F, CF), -122.65 (m, 4F, 2CF), -123.64 (m, 2F, CF), -123.26 (m, 2F, CF), -127.05 (m, 2F, CF).

*Tetraethyleneglycol 2-[2-(F-octyl)ethylsulfanyl]butanedioate (R: C8F17, n = 2). Yield: 88%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.42 (m, 2H, CF2CH2), 2.95 (m, 2H, CH2CH2S), 2.67–3.19 (m, 2H, O2CCH2CH), 3.65–6.78 (s, 12H, CH2(CH2OCH2)3CH2), 3.78 (m, 1H, SCHCO2), 4.25–4.45 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 22.60 (s, 1C, O2CCH2CH), 31.71 (t, 1C, CF2CH2), 36.59 (s, 1C, CH2CH2S), 41.93 (s, C, SCHCO2), 64.30, 64.97, 68.84, 68.97, 70.63, 70.76 (s, 6C, CH2(CH2OCH2)3CH2), 71.04, 70.92 (s, 2C, 2CO2CH2), 169.91, 170.75 (s, 2C, 2CO2).

19F NMR (CFCl3):(ppm) -81.74 (m, 3F, CF3), -115.29 (m, 2F, CF), -122.82 (m, 2F, CF), -122.88 (m, 4F, 2CF), -123.68 (m, 2F, CF), -124.28 (m, 2F, CF), -127.07 (m, 2F, CF).

*Pentaethyleneglycol 2-[2-(F-octyl)ethylsulfanyl]butanedioate (R: C8F17, n = 3). Yield: 86%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.45 (m, 2H, CF2CH2), 2.89 (m, 2H, CH2CH2S), 2.69–3.11 (m, 2H, O2CCH2CH), 3.62–3.65 (m, 16H, CH2(CH2OCH2)4CH2), 3.76 (m, 1H, SCHCO2), 4.20–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 23.31 (s, 1C, O2CCH2CH), 31.56 (t, 1C, CF2CH2), 36.24 (s, 1C, CH2CH2S), 42.24 (s, 1C, SCHCO2), 64.07, 64.67, 68.60, 68.80, 70.43, 70.48, 70.66, 70.76 (8s, 8C, CH2(CH2OCH2)4CH2), 70.91, 71.58 (2s, 2C, 2CO2CH2), 169.71, 170.78 (2s, 2C, 2CO2).

19F NMR (CFCl3): (ppm) -81.73 (m, 3F, CF3), -115.26 (m, 2F, CF), -122.79 (m, 2F, CF), -122.74 (m, 4F, 2CF), -123.69 (m, 2F, CF), -124.25 (m, 2F, CF), -127.05 (m, 2F, CF).

*Hexaethyleneglycol 2-[2-(F-octyl)ethylsulfanyl]butanedioate (R: C8F17, n = 4). Yield: 85%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.49 (m, 2H, CF2CH2), 2.93 (m, 2H, CH2CH2S), 2.79–3.10 (m, 2H, O2CCH2CH), 3.62–3.75 (m, 20H, CH2(CH2OCH2)5CH2), 3.78 (m, 1H, SCHCO2), 4.25–4.35 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 23.36 (s, 1C, O2CCH2CH), 31.73 (t, 1C, CF2CH2), 36.36 (s, 1C, CH2CH2S), 42.29 (s, 1C, SCHCO2), 64.45, 64.63, 65.00, 68.91, 69.02, 70.78, 70.81, 70.86, 70.88, 70.91 (10s, 10C, CH2(CH2 OCH2)5CH2), 71.16, 71.28 (2s, 2C, 2CO2CH2), 169.97, 170.97 (2s, 2C, 2CO2).

19F NMR(CFCl3):(ppm) -81.75 (m, 3F, CF3), -115.29 (m, 2F, CF), -122.81 (m, 2F, CF), -122.76 (m, 4F, 2CF), -123.70 (m, 2F, CF), -124.27 (m, 2F, CF), -127.11 (m, 2F, CF).

**Bitail surfactants (2)**

*Di-octyl 2-[(triethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6H13, n = 1) . Yield: 91%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 0.88 (m, 6H, 2CH3CH2), 1.32 (s, 20H, 2CH3(CH2)5), 1.65 (m, 4H, 2CH2CH2CH2O), 4.05–4.18 (m, 4H, 2CH2CH2CH2OCO), 2.78-3.03 (m, 4H, 2 O2CCH2CHS), 3.71 (m, 2H, 2SCHCH2), 3.62–3.75 (m, 8H, CH2(CH2OCH2)2CH2), 3.92–4.45 (m, 4H, 2CO2CH2CH2O).

13C NMR (CDCl3): (ppm) 14.01 (s, 2C, 2CH3CH2), 22.56 (s, 2C, 2CH3CH2), 25.75 (s, 2C, 2CH3CH2CH2), 28.44 (s, 2C, 2CH3(CH2)2CH2), 29.10 (s, 4C, 2CH3(CH2)3CH2CH2), 31.70 (s, 2C, 2CH2CH2CH2O), 68.72, 68.83, (2s, 2C, 2CH2CH2CH2O), 36.27, 36.50, 37.03, 37.22 (4s, 2CH2CH), 41.72, 41.95, 42.31, 42.34 (4s, 2SCHCH2), 63.69, 64.49, 65.17, 65.80 (4s, 4C, CH2(CH2OCH2)2CH2), 69.47, 69.67 (2s, 2C, 2CO2CH2CH2O), 169.67, 169.68, 170.07, 170.27, 170.58, 170.71, 170.98, 171.18 (8s, 4C, 4CO2).

*Di-octyl 2-[(tetraethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6H13, n = 2). Yield:891%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 0.90 (m, 6H, 2CH3CH2), 1.26 (s, 20H, 2CH3(CH2)5), 1.68 (m, 4H, 2CH2CH2CH2O), 4.08–4.20 (m, 4H, 2CH2CH2CH2OCO), 2.77-3.02 (m, 4H, 2O2CCH2CHS), 3.75 (m, 2H, 2SCHCH2), 3.65–3.80 (m, 12H, CH2(CH2OCH2)3CH2), 3.90–4.50 (m, 4H, 2CO2CH2CH2O).

13C NMR (CDCl3): (ppm) 14.02 (s, 2C, 2CH3CH2), 22.58 (s, 2C, 2CH3CH2), 25.76 (s, 2C, 2CH3CH2CH2), 28.46 (s, 2C, 2CH3(CH2)2CH2), 29.11 (s, 4C, 2CH3(CH2)3CH2CH2), 31.71 (s, 2C, 2CH2CH2CH2O), 68.22, 68.83, (2s, 2C, 2CH2CH2CH2O), 36.21, 36.64, 37.12, 37.28 (4s, 2C, 2O2CCH2CHS), 41.90, 41.94, 42.07, 42.32 (4s, 2C, 2O2CCH2CHS), 64.12, 64.43, 64.90, 65.17, 65.80, 65.87 (6s, 6C, CH2(CH2OCH2)3CH2), 70.26, 70.54 (2s, 2C, 2CO2CH2CH2O), 169.64, 169.76, 169.95, 170.11, 170.34, 170.52, 170.84, 171.16 (8s, 4C, 4CO2).

*Di-octyl 2-[(pentaethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6H13, n = 3). Yield: 86%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 0.86 (m, 6H, 2CH3CH2), 1.28 (m, 20H, 2CH3(CH2)5), 1.66 (m, 4H, 2CH2CH2CH2O), 4.06–4.18 (m, 4H, 2CH2CH2CH2OCO), 2.77-3.03 (m, 4H, 2O2CCH2CHS), 3.78 (m, 2H, 2SCHCH2), 3.62–3.80 (m, 16H, CH2(CH2OCH2)4CH2), 3.92–4.48 (m, 4H, 2CO2CH2CH2O).

13C NMR (CDCl3): (ppm) 14.01 (s, 2C, 2CH3CH2), 22.54 (s, 2C, 2CH3CH2), 25.75 (s, 2C, 2CH3CH2CH2), 28.44 (s, 2C, 2CH3(CH2)2CH2), 29.14 (s, 4C, 2CH3(CH2)3CH2CH2), 31.73 (s, 2C, 2CH2CH2CH2O), 68.26, 68.84, (2s, 2C, 2CH2CH2CH2O), 36.23, 36.86, 37.18, 37.30 (4s, 2O2CCH2CHS), 41.76, 41.91, 42.05, 42.36 (4s, 2 O2CCH2CHS), 63.84, 64.10, 64.37, 64.86, 65.14, 65.78, 65.82, 65.96 (8s, 8C, CH2(CH2OCH2)4CH2), 70.25, 70.57 (2s, 2C, 2CO2CH2CH2O), 169.63, 169.85, 169.96, 170.08, 170.26, 170.49, 170.86, 171.14 (8s, 4C, 4CO2).

*Di-octyl 2-[(hexaethyleneglycolbutanedioate)sulfanylbutanedioate (R: C6H13, n = 4). Yield: 83%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 0.87 (m, 6H, 2CH3CH2), 1.26 (m, 20H, 2CH3(CH2)5), 1.64 (m, 4H, 2CH2CH2CH2O), 4.04–4.20 (m, 4H, 2CH2CH2CH2OCO), 2.76-3.03 (m, 4H, 2O2CCH2CHS), 3.74 (m, 2H, 2SCHCH2), 3.64–3.78 (m, 20H, CH2(CH2OCH2)5CH2), 3.90–4.45 (m, 4H, 2CO2CH2CH2O).

13C NMR (CDCl3): (ppm) 14.01 (s, 2C, 2CH3CH2), 22.53 (s, 2C, 2CH3CH2), 25.76 (s, 2C, 2CH3CH2CH2), 28.47 (s, 2C, 2CH3(CH2)2CH2), 29.16 (s, 4C, 2CH3(CH2)3CH2CH2), 31.73 (s, 2C, 2CH2CH2CH2O), 68.28, 68.83, (2s, 2C, 2CH2CH2CH2O), 36.22, 36.57, 37.09, 37.29 (4s, 2C, 2O2CCH2CHS), 41.64, 41.92, 42.06, 42.34 (4s, 2O2CCH2CHS), 63.83, 64.11, 64.39, 64.82, 65.08, 65.16, 65.34, 65.77, 65.82, 65.94 (10s, 10C, CH2(CH2OCH2)5CH2), 70.28, 70.56 (2s, 2C, 2CO2CH2CH2O), 169.61, 169.87, 169.96, 170.12, 170.49, 170.66, 170.94, 171.08 (8s, 4C, 4CO2).

*Di-F-hexylethyl 2-[(triethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6F13, n = 1). Yield: 88%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.47 (m, 4H, 2CF2CH2), 4.37–4.48 (m, 4H, 2CF2CH2CH2O), 2.77, 3.03 (m, m, 4H, 2O2CCH2CHS), 3.94 (m, 2H, 2SCHCH2CO2), 3.61–3.70 (m, 8H, CH2(CH2OCH2)2CH2), 4.09–4.39 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.55 (m, 2C, 2CF2CH2CH2O), 57.54, 58.22 (2s, 2C, 2CF2CH2CH2O), 36.25, 36.41, 36.86, 37.08 (4s, 2O2CCH2CHS), 41.56, 41.88, 42.15, 42.26 (4s, 2C, 2O2CCH2CHS), 64.34, 65.04, 68.97, 69.05 (4s, 4C, CH2(CH2OCH2)2CH2), 70.82, 71.01 (2s, 2C, 2CO2CH2CH2O), 169.70, 169.86, 170.09, 170.12, 170.22, 170.42, 170.79, 170.94 (8s, 4C, 4CO2).

19F NMR (CFCl3) (ppm) -80.94 (m, 6F, 2CF3), -113.68 (m, 4F, 2CF), -121.92 (m, 4F, 2CF), -122.92 (m, 4F, 2CF), -123.61 (m, 4F, 2CF), -126.21 (m, 4F, 2CF).

*Di-F-hexylethyl 2-[(tetraethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6F13, n = 2). Yield: 87%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.48 (m, 4H, 2CF2CH2), 4.40–4.50 (m, 4H, 2CF2CH2CH2O), 2.77, 3.04 (m, 4H, 2O2CCH2CHS), 3.90–3.12 (m, 2H, 2SCHCH2CO2), 3.60–3.75 (m, 12H, CH2(CH2OCH2)3CH2), 4.05–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.46 (m, 2C, 2CF2CH2CH2O), 57.58, 58.16 (2s, 2C, 2CF2CH2CH2O), 36.30, 36.65, 37.13, 37.26 (4s, 2 O2CCH2CHS), 41.34, 41.70, 42.13, 42.32 (4s, 2SCHCH2), 63.86, 64.21, 64.33, 64.67, 65.05, 65.49 (6s, 6C, CH2(CH2OCH2)3CH2), 70.75, 71.30 (2s, 2C, 2CO2CH2CH2O), 169.77, 169.84, 169.89, 170.12, 170.34, 170.58, 170.82, 171.06 (8s, 4C, 4CO2).

19F NMR (CFCl3) (ppm) -81.23 (m, 6F, 2CF3), -113.82 (m, 4F, 2CF), -122.10 (m, 4F, 2CF), -123.10 (m, 4F, 2CF), -123.79 (m, 4F, 2CF), -126.43 (m, 4F, 2CF).

*Di-F-hexylethyl 2-[(pentaethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6F13, n = 3). Yield: 84%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.46 (m, 4H, 2CF2CH2), 4.40–4.48 (m, 4H, 2CF2CH2CH2O), 2.76, 3.03 (m, m, 4H, 2O2CCH2CHS), 3.96 (m, 2H, 2SCHCH2), 3.58–3.75 (m, 16H, CH2(CH2OCH2)4CH2), 4.10–4.45 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.51 (m, 2C, 2CF2CH2CH2O), 57.92, 58.84 (2s, 2C, 2CF2CH2CH2O), 36.36, 36.64, 37.12, 37.22 (4s, 2 O2CCH2CHS), 41.32, 41.62, 42.14, 42.28 (4s, 2O2CCH2CHS), 63.86, 64.12, 64.21, 64.33, 64.67, 65.05, 65.49, 65.76 (8s, 8C, CH2(CH2OCH2)4CH2), 70.78, 71.24 (2s, 2C, 2CO2CH2CH2O), 169.72, 169.78, 169.82, 169.94, 170.14, 170.46, 170.74, 170.96 (8s, 4C, 4CO2).

19F NMR (CFCl3) (ppm) -81.16 (m, 6F, 2CF3), -113.74 (m, 4F, 2CF), -122.34 (m, 4F, 2CF), -123.12 (m, 4F, 2CF), -123.81 (m, 4F, 2CF), -126.46 (m, 4F, 2CF).

*Di-F-hexylethyl 2-[(hexaethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C6F13, n = 4). Yield: 81%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.45 (m, 4H, 2CF2CH2), 4.40–4.50 (m, 4H, 2CF2CH2CH2O), 2.78, 3.05 (m, m, 4H, 2O2CCH2CHS), 3.93 (m, 2H, 2SCHCH2), 3.62–3.71 (m, 20H, CH2(CH2OCH2)5CH2), 4.15–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.45 (m, 2C, 2CF2CH2CH2O), 58.10, 58.91 (2s, 2C, 2CF2CH2CH2O), 36.24, 36.74, 37.12, 37.32 (4s, 2O2CCH2CHS), 41.54, 41,86, 42.16, 42.34 (4s, 2CH2CHS), 63.76, 64.16, 64.18, 64.42, 64.54, 65.12, 65.56, 65.76, 68.42, 69.12 (10s, 10C, CH2(CH2OCH2)5CH2), 70.68, 71.18 (2s, 2C, 2CO2CH2CH2O), 169.73, 169.80, 169.88, 169.94, 170.18, 170.39, 170.65, 170.94 (8s, 4C, 4CO2).

19F NMR (CFCl3): (ppm) -81.21 (m, 6F, 2CF3), -114.14 (m, 4F, 2CF), -122.84 (m, 4F, 2CF), -123.72 (m, 4F, 2CF2), -124.28 (m, 4F, 2CF2d), -126.92 (m, 4F, 2CF2x).

*Di-F-octylethyl 2-[(triethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C8F17, n = 1). Yield: 86%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.49 (m, 4H, 2CF2CH2), 4.38–4.47 (m, 4H, 2CF2CH2CH2O), 2.76-3.03 (m, 4H, 2O2CCH2CHS), 3.92 (m, 2H, 2SCHCH2), 3.60–3.68 (m, 8H, CH2(CH2OCH2)2CH2), 4.10–4.38 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.57 (m, 2C, 2CF2CH2CH2O), 57.56, 59.14 (2s, 2C, 2CF2CH2CH2O), 36.24, 36.42, 36.96, 37.15 (4s, 2O2CCH2CHS), 41.28, 41.86, 42.10, 42.27 (4s, 2C, 2CH2CHS), 64.32, 65.01, 68.94, 69.09 (4s, 4C, CH2(CH2OCH2)2CH2), 70.78, 70.98 (2s, 2C, 2CO2CH2CH2O), 169.42, 169.64, 169.81, 169.96, 170.14, 170.54, 170.76, 170.97 (8s, 4C, 4CO2).

19F NMR (CFCl3): (ppm) -81.10 (m, 6F, 2CF3), -113.98 (m, 4F, 2CF), -121.64 (m, 4F, 2CF), -121.86 (m, 8F, 2CF2cCF), -122.88 (m, 4F, 2CF), -123.58 (m, 4F, 2CF), -126.18 (m, 4F, 2CF).

*Di-F-octylethyl 2-[(tetraethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C8F17, n = 2). Yield: 85%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.50 (m, 4H, 2CF2CH2), 4.36–4.42 (m, 4H, 2CF2CH2CH2O), 2.77-3.04 ( m, 4H, 2O2CCH2CHS), 3.98 (m, 2H, 2SCHCH2), 3.70 (m, 12H, CH2(CH2OCH2)3CH2), 4.10–4.45 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.54 (m, 2C, 2CF2CH2CH2O), 57.52, 58.10 (2s, 2C, 2CF2CH2CH2O), 36.45, 36.75, 36.94, 37.24 (4s, 2C, 2O2CCH2CHS), 41.58, 41.81, 42.12, 42.28 (4s, 2SCHCH2), 63.78, 64.25, 65.06, 65.56, 68.94, 69.09 (6s, 6C, CH2(CH2OCH2)3CH2), 70.72, 71.08 (2s, 2C, 2CO2CH2CH2O), 169.68, 169.74, 169.86, 169.92, 170.12, 170.46, 170.73, 171.05 (8s, 4C, 4CO2).

19F NMR (CFCl3): (ppm) -81.28 (m, 6F, 2CF3), -114.08 (m, 4F, 2CF), -122.06 (m, 4F, 2CF), -122.30 (m, 8F, 2CFCF), -123.13 (m, 4F, 2CF), -123.85 (m, 4F, 2CF), -126.57 (m, 4F, 2CF).

*Di-F-octylethyl 2-[(pentaethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C8F17, n = 3). Yield: 83%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.48 (m, 4H, 2CF2CH2), 4.38–4.44 (m, 4H, 2CF2CH2CH2O), 2.75-3.02 (m, 4H, 2O2CCH2CHS), 3.98 (m, 2H, 2SCHCH2), 3.72 (m, 16H, CH2(CH2OCH2)4CH2), 4.08–4.40 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.58 (m, 2C, 2CF2CH2CH2O), 57.54, 58.12 (2s, 2C, 2CF2CH2CH2O), 36.23, 36.73, 37.06, 37.22 (4s, 2C, 2O2CCH2CHS), 41.45, 41.83, 42.04, 42.18 (4s, 2SCHCH2), 63.78, 64.25, 64.46, 64.84, 65.06, 65.56, 68.94, 69.09 (8s, 8C, CH2(CH2OCH2)4CH2), 70.73, 71.10 (2s, 2C, 2CO2CH2CH2O), 169.69, 169.74, 169.84, 169.89, 171.18, 170.42, 170.61, 170.98 (8s, 4C, 4CO2).

19F NMR (CFCl3): (ppm) -81.12 (m, 6F, 2CF3), -113.98 (m, 4F, 2CF), -121.96 (m, 4F, 2CF), -122.23 (m, 8F, 2CF2cCF), -123.09 (m, 4F, 2CF), -123.76 (m, 4F, 2CF), -126.45 (m, 2F, 4CF).

*Di-F-octylethyl 2-[(hexaethyleneglycolbutanedioate)sulfanyl]butanedioate (R: C8F17, n = 4). Yield: 80%. Eluent of purification CH2Cl2/CH3OH: 98/2.*

1H NMR (CDCl3): (ppm) 2.47 (m, 4H, 2CF2CH2), 4.35–4.45 (m, 4H, 2CF2CH2CH2O), 2.78, 3.03 (m, m, 4H, 2O2CCH2CHS), 3.98 (m, 2H, 2SCHCH2), 3.70 (m, 20H, CH2(CH2OCH2)5CH2), 4.10–4.42 (m, 4H, 2CO2CH2).

13C NMR (CDCl3): (ppm) 30.60 (m, 2C, 2CF2CH2CH2O), 57.56, 58.19 (2s, 2C, 2CF2CH2CH2O), 36.15, 36.54, 36.78, 37.18 (4s, 2O2CCH2CHS), 41.87, 42.19 (2s, 2SCHCH2), 63.76, 64.24, 64.42, 64.85, 65.08, 65.54, 65.92, 68.92, 69.07, 69.12 (10s, 10C, CH2(CH2OCH2)5CH2), 70.81, 71.13 (2s, 2C, 2CO2CH2CH2O), 169.64, 169.72, 169.87, 169.91, 170.24, 170.60, 170.82, 171.06 (8s, 4C, 4CO2).

19F NMR (CFCl3): (ppm) -81.14 (m, 6F, 2CF3), -113.92 (m, 4F, 2CF), -121.91 (m, 4F, 2CF), -122.26 (m, 8F, 2CFCF), -123.11 (m, 4F, 2CF), -123.74 (m, 4F, 2CF), -126.42 (m, 4F, 2CF).

**Bolaphil surfactants (3)**

*Decane-1,10-diyl bis[(triethyleneglycol butanedioate sulfanyl)acetate] (R: C8H16, n = 1). Yield: 88%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3):(ppm) 1.31 (m, 12H, OCH2CH2(CH2)6CH2CH2O), 1.62 (m, 4H, OCH2CH2(CH2)6CH2CH2O), 2.68-3.10 (m, 2H, 2O2CCHCH2CO2), 3.37-3.58 (m, 4H, 2O2CCH2SCH), 3.57–3.75 (m, 16H, 2CH2(CH2OCH2)2CH2), 4.05–4.35 (m, 8H, 4CO2CH2CH2O), 4.40 (m, 4H, OCH2CH2(CH2)6CH2CH2O).

13C NMR (CDCl3): (ppm) 25.72, 28.22, 28.65, 29.07 (s, 8C, OCH2(CH2)8CH2O), 22.62 (s, 2C, 2O2CCH2CH), 36.63 (s, 2C, 2O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 63.86, 64.52, 68.71, 68.91 (4 s, 8C, 2CH2(CH2OCH2)2CH2), 70.10 (s, 2C, 2CH2CH2CH2O), 69.49, 69.81 (2s, 4C, 4CO2CH2CH2O), 169.81, 170.81, 171.12 (3 s, 6C, 6CO2).

*Decane-1,10-diyl bis[(tetraethyleneglycol butanedioate sulfanyl)acetate] (R: C8H16, n = 2). Yield: 84%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 1.32 (s, 12H, OCH2CH2(CH2)6CH2CH2O), 1.64 (m, 4H, OCH2CH2(CH2)6CH2CH2O), 2.68-3.10 (m, 2H, 2O2CCHCH2CO2), 3.40-3.73 (m, 4H, 2O2CCH2SCH), 3.62-3.78 (m, 24H, 2CH2(CH2OCH2)3CH2), 4.06–4.40 (m, 8H, 4CO2CH2CH2O), 4.42 (m, 4H, OCH2CH2(CH2)6CH2CH2O).

13C NMR (CDCl3): (ppm) 25.72, 28.22, 28.65, 29.07 (s, 8C, OCH2(CH2)8CH2O, 22.62 (s, 2C, 2O2CCH2CHS), 36.61 (s, 2C, 2 O2CCH2SCH), 41.72 (s, 2C, 2SCHCO2), 64.26, 64.94, 68.81, 68.95, 70.59, 70.72 (6 s, 12C, 2CH2(CH2OCH2)3CH2), 70.02, 70.90 (2s, 4C, 4CO2CH2CH2O), 70.15(s, 2C, 2CH2CH2CH2O), 169.86, 170.24, 171.20 (3s, 6C, 6CO2).

*Decane-1,10-diyl bis[(pentaethyleneglycol butanedioate sulfanyl)acetate] (R: C8H16, n = 3).*

*Yield: 79%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 1.31 (s, 12H, OCH2CH2(CH2)6CH2CH2O), 1.64 (m, 4H, OCH2CH2(CH2)6CH2CH2O), 2.68 (m, 2H, 2CO2CHCH2CO2), 3.10 (m, 2H, 2CO2CHCH2CO2), 3.38-3.57 (m, 4H, 2 O2CCH2SCH) 3.62– 3.65 (m, 32H, 2CH2(CH2OCH2)4CH2), 3.73 (m, 2H, 2CO2CHCH2CO2), 4.20– 4.45 (m, 8H, 4CO2CH2CH2O), 4.41 (m, 4H, OCH2CH2(CH2)6CH2CH2O).

13C NMR (CDCl3): (ppm) 25.72, 28.22, 28.65, 29.07 (4 s, 8C, OCH2(CH2)8CH2O), 22.64 (s, 2C, 2CO2CH2CH), 36.59 (s, 2C, 2O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 64.22, 64.82, 68.84, 68.78, 70.11, 70.60, 70.65, 70.83 (8 s, 16C, 2CH2(CH2OCH2)4CH2), 70.92, 71.07 (2s, 4C, 4CO2CH2CH2O), 71.12 (s, 2C, 2CH2CH2CH2O), 170.40, 170.75, 171.64 (3 s, 6C, 6CO2).

*Dodecane-1,12-diyl bis[(triethyleneglycol butanedioate sulfanyl)acetate] (R: C10H20, n = 1).*

*Yield: 85%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3/TMS): (ppm) 1.30 (m, 16H, OCH2CH2(CH2)8CH2CH2O), 1.61 (m, 4H, OCH2CH2(CH2)8CH2CH2O), 2.68-3.73 (m, 2H, 2O2CCHCH2CO2), 3.38-3.57 (m, 4H, 2O2CCH2SCH), 3.57-3.75 (m, 16H, 2CH2(CH2OCH2)2CH2), 4.05–4.35 (m, 8H, 4CO2CH2CH2O), 4.40 (m, 4H, OCH2CH2(CH2)8CH2CH2O).

13C NMR (CDCl3): (ppm) 24.14, 25.72, 28.22, 28.65, 29.07 (5 s, 10C, OCH2(CH2)10CH2O), 22.62 (s, 2C, 2O2CCH2CH), 36.54 (s, 2C, 2 O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 63.86, 64.52, 68.71, 68.91 (4 s, 8C, 2CH2(CH2OCH2)2CH2), 70.10 (s, 2C, 2CH2CH2CH2O), 69.49, 69.81 (2s, 4C, 4CO2CH2 CH2O), 169.81, 170.81, 171.12 (3 s, 6C, 6CO2).

*Dodecane-1,12-diyl bis[(tetraethyleneglycol butanedioate sulfanyl)acetate] (R: C10H20, n = 2). Yield: 82%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl): (ppm) 1.32 (s, 16H, OCH2CH2(CH2)8CH2CH2O), 1.64 (m,4H, OCH2CH2(CH2)8CH2CH2O), 2.68-3.73 (m, 2H, 2O2CCHCH2CO2), 3.39, 3.58 (m, 4H, 2 O2CCH2SCH), 3.62-3.78 (m, 24H, 2CH2(CH2OCH2)3CH2), 4.06–4.40 (m, 8H, 4CO2CH2CH2O), 4.42 (m, 4H, OCH2CH2(CH2)8CH2CH2O).

13C NMR (CDCl3): (ppm) 24.74, 25.72, 28.22, 28.65, 29.07 (5s, 10C, OCH2(CH2)10CH2O), 22.62 (s, 2C, 2O2CCH2CHCO2), 36.53 (s, 2C, 2O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 64.26, 64.94, 68.81, 68.95, 70.59, 70.72 (6 s, 12C, 2CH2(CH2 OCH2)3CH2), 70.02, 70.90 (2s, 4C, 4CO2CH2CH2O), 70.15(s, 2C, 2CH2CH2CH2O), 169.86, 170.24, 171.20 (3s, 6C, 6CO2).

*Dodecane-1,12-diyl bis[(pentaethyleneglycol butanedioate sulfanyl)acetate] (R: C10H20, n = 3). Yield: 78%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 1.31(s, 16H, OCH2CH2(CH2)8CH2CH2O), 1.64 (m, 4H,OCH2CH2(CH2)8CH2CH2O), 2.68-3.73 (m, 2H, 2O2CCHCH2CO2), 3.38-3.56 (m, 4H, 2O2CCH2SCH), 3.62-3.65 (m, 32H, 2CH2(CH2OCH2)4CH2), 4.20–4.45 (m, 8H, 4CO2CH2CH2O), 4.41 (m, 4H, OCH2CH2(CH2)8CH2CH2O).

13C NMR (CDCl3): (ppm) 24.76, 25.72, 28.22, 28.65, 29.07 (5 s, 10C, OCH2(CH2)10CH2O), 22.64 (s, 2C, 2 O2CCH2CHS), 36.59 (s, 2C, 2O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 64.22, 64.82, 68.84, 68.78, 70.11, 70.60, 70.65, 70.83 (8 s, 16C, 2CH2(CH2OCH2)4CH2), 70.92, 71.07 (2s, 4C, 4CO2CH2CH2O), 71.12 (s, 2C, 2CH2CH2CH2O), 170.40, 170.75, 171.64 (3 s, 6C, 6CO2).

*Hexadecafluorodecane-1,10-diyl bis[(triethyleneglycol butanedioate sulfanyl)acetate] (R: C8F16, n = 1). Yield: 88%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3):(ppm) 2.81-3.74 (m, 2CO2CHCH2CO2), 3.38-3.56 (2d, 4H, 2CO2CH2SCH), 3.57–3.76 (m, 16H, 2CH2(CH2OCH2)2CH2), 4.20–4.50 (m, 8H, 4CO2CH2CH2O), 4.40 (m, 4H, 2CF2CH2O).

13C NMR(CDCl3): (ppm) 22.59 (s, 2C, 2O2CCH2CH), 36.51(s, 2C, 2O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 63.86, 64.52, 68.71, 68.91 (4s, 8C, 2CH2(CH2OCH2)2CH2), 69.49, 69.81, (2s, 4C, 4CO2CH2CH2O), 70.12 (t, 2C, 2CF2CH2O), 169.85, 170.34, 170.82 (3s, 6C, 6CO2).

19F NMR (CDCl3): (ppm) -119.54 (m, 4F, 2CF2CH2), -120.66 (m, 4F, 2CF2CF2CH2), -122.08 (m, 8F, 2CF2CF2(CF2)2CH2), -123.24 (m, 4F, 2CF2(CF2)4 CH2).

*Hexadecafluorodecane-1,10-diyl bis[(tetraethyleneglycol butanedioate sulfanyl)acetate] (R: C8F16, n = 2). Yield: 81%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.77-3.78 (m, 2O2CCHCH2CO2), 3.38-3.58 (m, 4H, 2O2CCH2SCH), 3.62-3.78 (s, 24H, 2CH2(CH2OCH2)3CH2), 4.18-4.55 (m, 8H, 4CO2CH2CH2O), 4.45 (m, 4H, CF2CH2O).

13C NMR (CDCl3): (ppm) 22.52 (s, 2C, 2O2CCH2CHCO2), 31.68 (t, 2C, 2CF2CH2), 36.49 (s, 2C, 2O2CCH2S), 41.86 (s, 2C, 2SCHCO2), 64.26, 64.94, 68.81, 68.95, 70.59, 70.72 (6 s, 12C, 2CH2(CH2OCH2)3CH2), 71.02, 70.90 (2s, 4C, 4CO2CH2CH2O), 71.23 (t, 2C, 2CF2CH2O), 169.85, 170.1, 170.82 (3s, 6C, 6CO2).

19F NMR (CDCl3): d (ppm) -119.54 (m, 4F, 2CF2CH2), -120.66 (m, 4F, 2CF2CF2CH2), -122.08 (m, 8F, 2CF2CF2(CF2)2CH2), -123.24 (m, 4F, 2CF2(CF2)4CH2).

*Hexadecafluorodecane-1,10-diyl bis[(pentaethyleneglycol butanedioate sulfanyl)acetate] (R: C8F16, n = 3). Yield: 76%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.75-3.76 (m, 2H, 2O2CCHCH2CO2), 3.39-3.58 (m, 4H, 2 O2CCH2SCH), 3.62–3.65(m, 32H, 2CH2(CH2OCH2)4CH2), 4.20–4.45 (m,8H, 4CO2CH2CH2O), 4.43 (m, 4H, 2CF2CH2O).

13C NMR: (ppm) 22.67 (s, 2C, O2CCH2CHCO2), 37.12 (s, 2C, 2 O2CCH2S), 42.40 (s, 2C, 2SCHCO2), 64.22, 64.82, 68.84, 68.78, 70.11, 70.60, 70.65, 70.83 (8 s, 16C, 2CH2(CH2OCH2)4CH2), 70.92, 71.07 (2s, 4C, 4CO2CH2CH2O), 70.41 (t, 2C, 2CF2CH2O), 169.89, 170.97, 171.12 (3 s, 6C, 6CO2).

19F NMR (CFCl3): (ppm) -119.54 (m, 4F, 2CF2CH2), -120.66 (m, 4F, CF2CF2CH2), -122.08 (m, 8F, 2CF2CF2(CF2)2CH2), -123.24 (m, 4F, 2CF2(CF2)4CH2).

*Eicosafluorododecane 1,12-diyl bis[(triethyleneglycol butanedioate sulfanyl)acetate] (R: C10F20, n = 1). Yield: 83%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.71-3.75 (m, 2H, 2O2CCHCH2CO2), 3.38-3.56 (m, 4H, 2CO2CH2SCH), 3.67-3.74 (m, 18H, 2CH2(CH2OCH2)2CH2), 4.25–4.45 (m, 8H, 4CO2CH2CH2O), 4.41 (m, 4H, 2CF2CH2O).

13C NMR (CDCl3): (ppm) 22.54 (s, 2C, 2OC2CH2CHCO2), 31.72 (t, 2C, 2CF2CH2), 36.49 (s, 2C,2O2CCH2S), 41.72 (s, 2C, 2SCHCO2), 63.86, 64.52, 68.70, 68.90 (4 s, 8C, 2CH2(CH2OCH2)2CH2), 69.49, 69.81 (2s, 4C, 4CO2CH2CH2O), 71.18 (t, 2C, 2CF2CH2O), 169.85, 170.14, 170.82 (3 s, 6C, 6CO2).

19F NMR (CDCl3):(ppm) -119.56 (m, 4F, 2CF2CH2O), -121.98 (m, 4F, CF2CF2CH2), -122.45 (m, 4F, 2CF2(CF2)2CH2), -123.44 (m, 4F, 2CF2(CF2)3CH2), -123.79 (m, 4F, 2CF2(CF2)4CH2).

Eicosafluorododecane -1,12-diyl bis[(tetraethyleneglycol butanedioate sulfanyl)acetate] (R: C10F20, n = 2). Yield: 78%. Eluent of purification CH2Cl2/CH3OH: 97/3.

1H NMR(CDCl3): (ppm) 2.67-3.78 (m, 2H, 2O2CCHCH2CO2), 3.39-3.58 (m, 2H, 2O2CCH2SCH), 3.65–6.78 (s, 24H, 2CH2(CH2OCH2)3CH2), 4.25–4.45 (m, 8H, 4CO2CH2CH2O), 4.43 (m, 4H, 2CF2CH2O).

13C NMR (CDCl): (ppm) 22.60 (s, 2C, 2O2CCH2CHCO2), 36.74 (s, 2C, 2 O2CCH2S), 41.96 (s, 2C, 2SCHCO2), 64.30, 64.97, 68.84, 68.97, 70.63, 70.76 (6 s, 12C, 2CH2(CH2OCH2)3CH2), 71.04, 70.92 (2s, 4C, 4CO2CH2CH2O), 71.12 (t, 2C, 2CF2CH2O), 169.91, 170.12, 170.75 (3s, 6C, 6CO2).

19F NMR (CFCl3): (ppm) -119.64 (m, 4F, 2CF2CH2), -121.96 (m, 4F, CF2CF2 CH2), -122.51 (m, 4F, 2CF2(CF2)2CH2), -123.48 (m, 4F, 2CF2(CF2)3CH2), 123.85 (m, 4F, 2CF2(CF2)4CH2).

*Eicosafluo rododecane-1,12- diyl bis[(pentaethyleneglycol butanedioate sulfanyl)acetate] (R: C10F20, n = 3). Yield: 74%. Eluent of purification CH2Cl2/CH3OH: 97/3.*

1H NMR (CDCl3): (ppm) 2.69-3.76 (m, 2H, 2O2CCHCH2CO2), 3.38-3.58 (m, 4H, 2 O2CCH2SCH), 3.62–3.65 (m, 32H, 2CH2(CH2OCH2)4CH2), 4.20–4.40 (m, 8H, 4CO2CH2CH2O), 4.38 (m, 4H, 2CF2CH2O).

13C NMR (CDCl3): (ppm) 23.31 (s, 2C, 2 O2CCH2CHCO2), 37.12 (s, 2C, 2O2CCH2S), 42.08 (s, 2C, 2SCHCO2), 64.07, 64.67, 68.60, 68.80, 70.43, 70.48, 70.66, 70.76 (8s, 16C, 2CH2(CH2OCH2)4CH2), 70.91, 71.18 (2s, 4C, 4CO2CH2CH2O), 71.28 (t, 3C, 2CF2CH2O), 169.71, 170.78, 171.08 (3s, 6C, 6CO2).

19F NMR (CFCl3):(ppm) -119.72 (m, 4F, 2CF2CH2), -121.98 (m, 4F, CF2CF2CH2), -122.47 (m, 4F, 2CF2(CF2)2CH2), -123.45 (m, 4F, 2CF2(CF2)3CH2), 123.81 (m, 4F, 2CF2(CF2)4CH2).

1. [↑](#footnote-ref-1)