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Preparation of sulfenyl pyrroles
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2,3-Bis(decylthio)-1H-pyrrole (5d,2)
2,3,4-Tris(decylthio)-1H-pyrrole (5d,3)
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Ethyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3f)
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3-(Phenylthio)-1H-pyrrole-2-carbaldehyde (8a)

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\((R)-1,1'-\text{Binaphthyl}-2,2'\-diyl bis(2-(2,4-dimethyl-5-(phenylthio))\-1H\-pyrrol-3-yl)acetate\) (9a)

4-Benzenesulfinyl-3,5-dimethyl-1H-pyrrole-2-carboxylic acid ethyl ester (10)

$^{13}$C NMR Spectra

2-(Phenylthio)isoindoline-1,3-dione (1a)
2-(Benzylthio)isoindoline-1,3-dione (1b)
2-(Ethylthio)isoindoline-1,3-dione (1c)
2-(Decylthio)isoindoline-1,3-dione (1d)
2-(Butylthio)isoindoline-1,3-dione (1e)
2-(4-Methoxyphenyl)isoindoline-1,3-dione (1f)

Benzyl 3,5-dimethyl-4-(phenylthio)-1H-pyrrole-2-carboxylate (2a)
Ethyl 3,5-dimethyl-4-(phenylthio)-1H-pyrrole-2-carboxylate (3a)
3-Ethyl-2,4-dimethyl-5-(phenylthio)-1H-pyrrole (4a)

2-(Phenylthio)-1H-pyrrole (5a)
2,5-Bis(phenylthio)-1H-pyrrole (5a,)

Benzyl 4-(benzylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2b)
Ethyl 4-(benzylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3b)
2-(Benzylsulfinyl)-4-ethyl-3,5-dimethyl-1H-pyrrole (4b)

2-(Benzylthio)-1H-pyrrole (5b)
2,5-Bis(benzylthio)-1H-pyrrole (5b,)

Benzyl 4-(ethylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2c)
Ethyl 4-(ethylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3c)
3-Ethyl-5-(ethylsulfinyl)-2,4-dimethyl-1H-pyrrole (4c)

2,5-Bis(ethylthio)-1H-pyrrole (5c,)
2,3-Bis(ethylthio)-1H-pyrrole (5c,)
2,3,4-Tris(ethylthio)-1H-pyrrole (5c,)

Benzyl 4-(decylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2d)
Ethyl 4-(decylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3d)
2-(Decylthio)-4-ethyl-3,5-dimethyl-1H-pyrrole (4d)

2-(Decylthio)-1H-pyrrole (5d)
2,5-Bis(decylthio)-1H-pyrrole (5d,)
2,3-Bis(decylthio)-1H-pyrrole (5d,)
2,3,4-Tris(decylthio)-1H-pyrrole (5d,)

Benzyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2f)
Ethyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3f)
3-Ethyl-5-(4-methoxyphenylthio)-2,4-dimethyl-1H-pyrrole (4f)

2-(4-Methoxyphenylthio)-1H-pyrrole (5f)
2-(4-Methoxybenzyl)-5-(4-methoxyphenylthio)-1H-pyrrole (5f,)

Ethyl 2,4-dimethyl-5-(phenylthio)-1H-pyrrole-3-carboxylate (6a)
1-(2,4-Dimethyl-5-(phenylthio)-1H-pyrrol-3-yl)heptane-1,6-dione (7a)

3-(Phenylthio)-1H-pyrrole-2-carbaldehyde (8a)

(R)-1,1'-Binaphthyl-2,2'-diyl bis(2-(2,4-dimethyl-5-(phenylthio))\-1H\-pyrrol-3-yl)acetate (9a)

4-Benzenesulfinyl-3,5-dimethyl-1H-pyrrole-2-carboxylic acid ethyl ester (10)

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General methods and materials
All 'H NMR (500 MHz) and 13C NMR (125 MHz) chemical shifts are reported in ppm using tetramethylsilane (0.00 ppm) or the solvent signal (CDCl₃: 'H 7.26 ppm; 13C 77.16 ppm) as an internal reference. The 'H NMR chemical shifts and coupling constants were determined assuming first-order behaviour. Multiplicity is indicated by: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), and br (broad). All coupling constants are reported to the nearest 0.5 Hertz (Hz). The 13C NMR multiplicities (i.e., s = C, d = CH, t = CH₂, q = CH₃) were determined using 13C-DEPTQ-135 and/or HSQC and HMBC experiments and/or made on the basis of chemical shift and relative signal intensities. Mass spectra were obtained using a Thermo Finnigan LCQ duo ion trap (ESI) and Bruker Daltronics® microTOF (ESI) instruments. Flash column chromatography (FCC) was performed using 230-400 mesh ultra pure silica. Preparative thin-layer chromatography (PTLC) was carried out on glass plates (20×20 cm) pre-coated (0.25 mm) with silica gel 60 F254. With the exclusion of solvents, chemicals were used as received. Dry and deoxygenated CH₂Cl₂ and tetrahydrofuran were obtained using a commercial solvent purification system. The preparations and data for the following compounds were described previously: 2-(phenylthio)isoindoline-1,3-dione (1a), 1-3 2-(benzylthio)isoindoline-1,3-dione (1b), 1 2-(ethylthio)isoindoline-1,3-dione (1c), 1 2-(tert-butylthio)isoindoline-1,3-dione (1e), 1 2-(phenylthio)-1H-pyrrole (5a), 4,5 2-(benzylthio)-1H-pyrrole (5b), 6 2-(decylthio)-1H-pyrrole (5d), 5 2-Benzenesulfinylisoindole-1,3-dione (10). 3,7

General procedures
Synthesis of sulfenylating reagents 1a-d (GP1):
SO₂Cl₂ (1.0 equiv; ca. 5 M in dichloromethane) was added dropwise via a dropping funnel to a solution of thiol (0.05 mol; ca. 1 M in dichloromethane) and Et₃N (0.1 mL) at 0 °C. After stirring for 15 min, the mixture was warmed to room temperature for 30 min and then cooled to 0 °C. The resulting solution was transferred dropwise via cannula to a solution of phthalimide (1.0 equiv; ca. 1 M in dichloromethane) and Et₃N (1.3 equiv) at 0 °C, and the mixture was then warmed to room temperature over 1 h. The solution was diluted with water and extracted with CH₂Cl₂ (3x) before being dried over Na₂SO₄ and then concentrated to give crude product that was purified using recrystallization. For samples with appreciable amounts of phthalimide present, the crude was dissolved with CH₂Cl₂, diluted with 1 M NaOH and extracted with CH₂Cl₂ (3x) before being dried over Na₂SO₄ and then concentrated before being purified using recrystallization.
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Synthesis of sulfenylating reagents 1e and 1f (GP2):
SO$_2$Cl$_2$ (1.0 equiv; ca. 5 M in hexanes) was added dropwise via a dropping funnel to a solution of thiol (0.05 mol; ca. 1 M in hexanes) and Et,N (0.1 mL) at 0 °C. After stirring for 15 min, the mixture was warmed to room temperature for 30 min and then cooled to 0 °C. The resulting solution was transferred dropwise via cannula to a solution of phthalimide (1.0 equiv; ca. 1 M in DMF) and Et,N (1.3 equiv) and stirring was continued at room temperature for 1 h. The solution was transferred to a beaker containing ice-cold water and the resulting suspension was filtered and then washed with ice-cold water before being dried to give crude product that was purified using recrystallization. For samples with appreciable amounts of phthalimide present, the crude was dissolved with CH$_2$Cl$_2$, diluted with 1 M NaOH and extracted with CH$_2$Cl$_2$ (3x) before being dried over Na$_2$SO$_4$ and then concentrated before being purified using recrystallization.

Synthesis of sulfenylated pyrroles 2a, 2c, 2f, 3a, 3c, 3d, 3f, 4a-d, 4f, 5a, 5a2, 5b, 5b', 5c, 5c', 5d, 5d', 5e, 5g, 5d', 5f, 5f', 6a, 7a, 9a, and 10 (GP3):
A stirred suspension of the pyrrole (0.44 mmol), thiophthalimide sulfenylating reagent (1.0 equiv), and MgBr$_2$ (0.01 equiv) in degassed N,N-dimethylacetamide (1 mL) was heated at 90 °C for 1 h. After cooling to room temperature, the solution was diluted with EtOAc and extracted with 1 M NaOH (3x) before being dried over Na$_2$SO$_4$ and then concentrated to give crude product that was purified using flash column chromatography (FCC).

Synthesis of sulfenylated pyrroles 2b, 2d, 3b, and 8a (GP4):
A stirred suspension of the pyrrole (0.44 mmol), thiophthalimide sulfenylating reagent (1.6 equiv), Et,N (0.7 equiv), and MgBr$_2$ (0.5 equiv) in degassed N,N-dimethylacetamide (1 mL) was heated at 90 °C for 1 d. After cooling to room temperature, the solution was diluted with EtOAc and extracted with 1 M NaOH (3x) before being dried over Na$_2$SO$_4$ and then concentrated to give crude product that was purified using flash column chromatography (FCC) or preparative thin-layer chromatography (PTLC).

Synthetic procedures
2-(Phenylthio)isoindoline-1,3-dione (1a)$^{13}$
GP1: Recrystallization from ethanol gave the title compound as a yellow solid (9.6 g, 83%); mp 163-164 °C (ethanol). $^1$H NMR (500 MHz, CDCl$_3$): δ 7.93 (2H, dd, J = 3, 5.5 Hz), 7.78 (2H, dd, J = 3, 5.5 Hz), 7.62-7.58 (2H, m), 7.33-7.25 (3H, m). $^{13}$C NMR (125 MHz, CDCl$_3$): δ 167.9 (s x2), 135.3 (s), 134.9 (d x2), 132.2 (s x2), 131.2 (d x2), 129.5 (d x3), 124.3 (d x2). HRMS m/z calc. for C$_{14}$H$_9$NO$_2$S: 255.0354 (278.0252 for M+Na); Found: 278.0246 (ESI+).
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2-(Benzylthio)isoindoline-1,3-dione (1b)

GP1: Recrystallization from 50% EtOAc in hexanes gave the title compound as a white solid (4.1 g, 30%); mp 166-167 °C (50% EtOAc in hexanes). \(^1\)H NMR (500 MHz, CDCl\(_3\)): δ 7.85 (2H, dd, J = 3, 5.5 Hz), 7.74 (2H, dd, J = 3, 5.5 Hz), 7.30-7.19 (5H, m), 4.11 (2H, s). \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 168.1 (s x2), 134.7 (d x2), 134.5 (s), 132.1 (s x2), 129.7 (d x2), 128.8 (d x2), 128.1 (d), 124.0 (d x2), 42.7 (t). HRMS m/z calc. for C\(_{15}\)H\(_{11}\)NO\(_2\)S: 269.0510 (292.0408 for M+Na); Found: 292.0403 (ESI+).

2-(Ethylthio)isoindoline-1,3-dione (1c)

GP1: Recrystallization from ethanol gave the title compound as a white solid (6.6 g, 63%); mp 117-118 °C (ethanol). \(^1\)H NMR (500 MHz, CDCl\(_3\)): δ 7.94 (2H, dd, J = 3, 5.5 Hz), 7.79 (2H, dd, J = 3, 5.5 Hz), 2.92 (2H, q, J = 7 Hz), 1.29 (3H, t, J = 7 Hz). \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 168.8 (s x2), 134.8 (d x2), 132.3 (s x2), 124.1 (d x2), 32.9 (t), 13.4 (q). HRMS m/z calc. for C\(_{10}\)H\(_{9}\)NO\(_2\)S: 207.0354 (230.0252 for M+Na); Found: 230.0246 (ESI+).

2-(Decylthio)isoindoline-1,3-dione (1d)

GP1: Recrystallization from hexanes gave the title compound as a white solid (11.2 g, 70%); mp 60 °C (hexanes). \(^1\)H NMR (500 MHz, CDCl\(_3\)): δ 7.92 (2H, dd, J = 3, 5.5 Hz), 7.79 (2H, dd, J = 3, 5.5 Hz), 2.89 (2H, t, J = 7.5 Hz), 1.62-1.52 (2H, m), 1.43-1.39 (2H, m), 1.30-1.20 (12H, m), 0.87 (3H, t, J = 7 Hz). \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 168.6 (s x2), 134.7 (d x2), 132.3 (s x2), 124.0 (d x2), 38.8 (t), 32.0 (t), 29.63 (t), 29.57 (t), 29.4 (t), 28.8 (t), 28.3 (t), 22.8 (t), 14.2 (q). HRMS m/z calc. for C\(_{18}\)H\(_{25}\)NO\(_2\)S: 319.1606 (342.1504 for M+Na); Found: 342.1498 (ESI+).

2-(tert-Butylthio)isoindoline-1,3-dione (1e)

GP2: Recrystallization from hexanes gave the title compound as a white solid (2.6 g, 22%); mp 129-130 °C (hexanes). \(^1\)H NMR (500 MHz, CDCl\(_3\)): δ 7.95 (2H, dd, J = 3, 5.5 Hz), 7.79 (2H, dd, J = 3, 5.5 Hz), 1.36 (9H, s). \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 169.3 (s x2), 134.8 (d x2), 132.2 (s x2), 124.1 (d x2), 51.3 (s), 29.6 (q x3). HRMS m/z calc. for C\(_{12}\)H\(_{13}\)NO\(_2\)S: 235.0667 (258.0565 for M+Na); Found: 258.0559 (ESI+).

2-(4-Methoxyphenyl)isoindoline-1,3-dione (1f)

GP2: Recrystallization from 75% EtOAc in hexanes gave the title compound as a yellow solid (7.4 g, 70%); mp 203-204 °C (75% EtOAc in hexanes). \(^1\)H NMR (500 MHz, CDCl\(_3\)): δ 7.87 (2H, dd, J = 3, 5.5 Hz), 7.76 (2H, d, J = 9 Hz), 7.75-7.72 (2H, dd, J = 3, 5.5 Hz), 6.84 (2H, d, J = 9 Hz), 3.78 (3H, s). \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 168.0 (s x2), 161.6 (s), 136.8 (d x2), 134.7 (d x2), 132.2 (s x2), 125.7 (s), 120.7 (s), 113.4 (s) and 36.7 (s). HRMS m/z calc. for C\(_{15}\)H\(_{13}\)NO\(_2\)S: 269.0510 (292.0408 for M+Na); Found: 292.0403 (ESI+).
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124.0 (d x2), 114.9 (d x2), 55.6 (q). HRMS m/z calc. for C_{15}H_{11}NO_{3}S: 285.0460 (308.0357 for M+Na); Found: 308.0352 (ESI+).

Benzyl 3,5-dimethyl-4-(phenylthio)-1\textit{H}-pyrrole-2-carboxylate (2a)
GP3: FCC (10% EtOAc in hexanes) gave the title compound as a beige solid (140 mg, >95%); $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 9.27 (1H, br s), 7.44-7.33 (5H, m), 7.20-7.16 (2H, m), 7.07-7.03 (1H, m), 6.99-6.95 (2H, m), 5.33 (2H, s), 2.31 (3H, s), 2.29 (3H, s). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 161.4 (s), 139.2 (s), 138.7 (s), 134.6 (s), 133.4 (s), 129.0 (d x2), 128.8 (d x2), 128.4 (d), 128.4 (d x2), 125.5 (d x2), 124.8 (d), 118.2 (s), 110.0 (s), 66.2 (t), 12.2 (q), 11.6 (q). HRMS m/z calc. for C$_{20}$H$_{19}$NO$_2$S: 337.1136 (360.1034 for M+Na); Found: 360.1029 (ESI+).

Ethyl 3,5-dimethyl-4-(phenylthio)-1\textit{H}-pyrrole-2-carboxylate (3a)
GP3: FCC (10% EtOAc in hexanes) gave the title compound as a beige solid (118 mg, >95%). $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 9.35 (1H, br s), 7.20-7.16 (2H, m), 7.07-7.03 (1H, m), 6.99-6.97 (2H, m), 4.34 (2H, q, $J$ = 7 Hz), 2.31 (3H, s), 2.29 (3H, s), 1.38 (3H, t, $J$ = 7.5 Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 161.9 (s), 139.3 (s), 138.4 (s), 132.8 (s), 129.0 (d x2), 125.4 (d x2), 124.8 (d), 118.5 (s), 109.7 (s), 60.4 (t), 14.7 (q), 12.1 (q), 11.5 (q). HRMS m/z calc. for C$_{15}$H$_{17}$NO$_2$S: 275.0980 (298.0878 for M+Na); Found: 298.0872 (ESI+).

3-Ethyl-2,4-dimethyl-5-(phenylthio)-1\textit{H}-pyrrole (4a)
GP3: FCC (5% Et$_2$O in hexanes) gave the title compound as a purple solid (99 mg, >95%). $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 7.65 (1H, br s), 7.21-7.20 (2H, m), 7.05-7.06 (1H, m), 6.97-6.99 (2H, m), 2.43 (2H, q, $J$ = 7 Hz), 2.19 (3H, s), 2.07 (3H, s), 1.09 (3H, t, $J$ = 7 Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 140.2 (s), 129.1 (d x2), 127.1 (s), 126.9 (s), 125.6 (d x2), 125.0 (d), 122.7 (s), 109.1 (s), 18.2 (t), 15.7 (q), 11.6 (q), 10.1 (q). HRMS m/z calc. for C$_{14}$H$_{17}$NS: 231.1082 (230.1003 for M-H); Found: 230.1009 (ESI-).

2-(Phenylthio)-1\textit{H}-pyrrole (5a)$^{4,5}$
GP3 (10 mmol scale): FCC (5-10% EtOAc in hexanes) gave the title mono 5a as a purple oil (1.09 g, 62%) and bis 5a$_2$ as a gray solid (0.28 g, 10%) compounds. $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.14 (br s, 1H), 7.11-7.20 (m, 2H), 7.05-7.06 (m, 1H), 6.97-6.99 (m, 2H), 6.84-6.82 (m, 1H), 6.54-6.53 (m, 1H), 6.28-6.26 (m, 1H). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 139.4 (s), 129.1 (d x2), 126.0 (d x2), 125.6 (d), 122.0 (d), 118.8 (d), 115.7 (s), 110.6 (d). HRMS m/z calc. for C$_{16}$H$_{17}$NS: 175.0456 (174.0377 for M-H); Found: 174.0383 (ESI-).
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2,5-Bis(phenylthio)-1H-pyrrole (5a)

GP3: 'H NMR (500 MHz, CDCl₃): δ 8.33 (1H, br s), 7.25-7.20 (4H, m), 7.14-7.00 (6H, m), 6.61 (2H, d, J = 3 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 138.2 (s x2), 129.3 (d x4), 126.7 (d x4), 126.1 (d x2), 120.6 (s x2), 120.2 (d x2). HRMS m/z calc. for C₁₆H₁₃NS₂: 283.0439 (282.0411 for M-H); Found: 282.0417 (ESI-).

Benzyl 4-(benzylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2b)

GP4: Reaction stirred for 3 d; FCC (50-80% CH₂Cl₂ in hexanes) gave the title compound as a beige solid (62 mg, 41%). 'H NMR (500 MHz, CDCl₃): δ 8.70 (1H, br s), 7.44-7.30 (5 H, m), 7.20-7.18 (3H, m), 6.99-6.96 (2H, m), 5.30 (2H, s), 3.60 (2H, s), 2.29 (3H, s), 1.84 (3H, s). ¹³C NMR (125 MHz, CDCl₃): δ 161.0 (s), 139.0 (s x2), 138.7 (s), 136.6 (s), 129.2 (d x2), 128.8 (d x4), 126.9 (d x2), 117.2 (s), 111.7 (s), 66.0 (t), 41.0 (t), 11.7 (q), 11.4 (q). HRMS m/z calc. for C₂₁H₂₁NO₄S: 351.1293 (374.1191 for M+Na); Found: 374.1185 (ESI+).

Ethyl 4-(benzylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3b)

GP4: Reaction stirred for 3 d; FCC (70-100% CH₂Cl₂ in hexanes) gave the title compound as a beige solid (90 mg, 71%). 'H NMR (500 MHz, CDCl₃): δ 8.76 (1H, br s), 7.22-7.16 (3 H, m), 7.00-6.96 (2H, m), 4.30 (2H, q, J = 7 Hz), 3.60 (2H, s), 2.28 (3H, s), 1.86 (3H, s), 1.36 (3H, t, J = 7 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 161.7 (s), 139.0 (s), 138.4 (s), 132.6 (s), 129.2 (d x2), 128.4 (d x4), 126.9 (d), 117.9 (s), 111.8 (s), 60.2 (t), 41.0 (t), 14.8 (q), 11.6 (q), 11.3 (q). HRMS m/z calc. for C₁₆H₁₉NO₄S: 289.1136 (312.1034 for M+Na); Found: 312.1029 (ESI+).

2-(Benzylthio)-4-ethyl-3,5-dimethyl-1H-pyrrole (4b)

GP3: FCC (5% EtOAc in hexanes) gave the title compound as a purple solid (101 mg, 89%). 'H NMR (500 MHz, CDCl₃): δ 7.31 (1H, br s), 7.25-7.17 (3H, m), 7.07-7.00 (2H, m), 3.68 (2H, s), 2.33 (2H, q, J = 7 Hz), 2.09 (3H, s), 1.85 (3H, s), 1.03 (3H, t, J = 7.5 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 139.2 (s), 129.2 (d x2), 128.5 (d x2), 127.0 (d), 125.9 (s), 125.6 (s), 122.3 (s), 112.3 (s), 42.6 (t), 18.2 (t), 15.7 (q), 11.4 (q), 9.8 (q). HRMS m/z calc. for C₁₅H₁₉NS: 261.1187 (262.1266 for M+OH); Found: 262.1260 (ESI+).

2-(Benzylthio)-1H-pyrrole (5b)

GP3: FCC (5% EtOAc in hexanes) gave a 2.2:1.0 mixture of mono 5b and bis 5b₂ (48 mg). 'H NMR (500 MHz, CDCl₃): δ 7.83 (1H, br s), 7.34-7.17 (3H, m), 7.12-7.06 (2H, m), 6.73-6.69 (1H, m), 6.33-6.28 (1H, m), 6.20-6.15 (1H, m), 3.80 (2H, s). ¹³C NMR (125 MHz, CDCl₃): δ 139.1 (s), 129.0 (d
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x2), 128.7 (d x2), 127.3 (d), 120.7 (s), 119.0 (s), 117.1 (s), 110.1 (s), 43.3 (t). HRMS m/z calc. for C11H11NS: 189.0612 (188.0534 for M-H); Found: 188.0528 (ESI-).

2,5-Bis(benzylthio)-1H-pyrrole (5b)
GP3: 1H NMR (500 MHz, CDCl3): δ 7.50-7.29 (5H, m), 5.31 (2H, s), 2.51 (2H, q, J = 7 Hz), 2.39 (3H, s), 2.34 (3H, s), 1.12 (3H, t, J = 7 Hz). 13C NMR (125 MHz, CDCl3): δ 160.9 (s), 137.7 (s), 136.6 (s), 132.4 (s), 128.8 (d x2), 128.3 (d x3), 117.5 (s), 111.8 (s), 66.0 (t), 30.5 (t), 15.0 (q), 12.3 (q), 11.7 (q). HRMS m/z calc. for C18H17NO2S: 311.0802 (334.0700 for M+Na); Found: 334.0695 (ESI+).

Benzyl 4-(ethylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2c)
GP3: FCC (25% EtOAc in hexanes) gave a 1.5:1.0 mixture of starting material and the title compound (117 mg). 1H NMR (500 MHz, CDCl3): δ 8.83 (1H, br s), 7.50-7.29 (5H, m), 5.31 (2H, s), 2.51 (2H, q, J = 7 Hz), 2.39 (3H, s), 2.34 (3H, s), 1.12 (3H, t, J = 7 Hz). 13C NMR (125 MHz, CDCl3): δ 138.7 (s x2), 129.0 (d x4), 128.7 (d x4), 127.4 (d x2), 121.9 (s x2), 118.4 (s x2), 43.0 (t x2). HRMS m/z calc. for C16H19NO2S: 289.1136 (312.1034 for M+Na); Found: 312.1029 (ESI+).

Ethyl 4-(ethylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3c)
GP3: FCC (25% EtOAc in hexanes) gave the title compound as a yellow solid (92 mg, 93%), 1H NMR (500 MHz, CDCl3): δ 8.95 (1H, br s), 4.31 (2H, q, J = 7 Hz), 2.51 (2H, q, J = 7 Hz), 2.38 (3H, s), 2.35 (3H, s), 1.36 (3H, t, J = 7 Hz), 1.13 (3H, t, J = 7 Hz). 13C NMR (125 MHz, CDCl3): δ 162.2 (s), 137.4 (s), 132.4 (s), 117.9 (s), 112.7 (s), 60.2 (t), 30.5 (t), 15.0 (q), 14.8 (q), 12.3 (q), 11.6 (q). HRMS m/z calc. for C11H17NO2S: 227.0980 (250.0878 for M+Na); Found: 250.0872 (ESI+).

2-(Ethylthio)-4-ethyl-3,5-dimethyl-1H-pyrrole (4c)
GP3: FCC (20% CH2Cl2 in hexanes) gave the title compound as a blue solid (79 mg, 90%). 1H NMR (500 MHz, CDCl3): δ 7.58 (1H, br s), 2.55 (2H, q, J = 7 Hz), 2.37 (2H, q, J = 7 Hz), 2.16 (3H, s), 2.08 (3H, s), 1.17 (3H, t, J = 7.5 Hz), 1.06 (3H, t, J = 7.5 Hz). 13C NMR (125 MHz, CDCl3): δ 125.4 (s), 124.9 (s), 122.2 (s), 113.0 (s), 31.9 (t), 18.3 (t), 15.6 (q), 15.5 (q), 11.4 (q), 10.2 (q). HRMS m/z calc. for C10H17NS: 199.1031 (200.1109 for M+OH); Found: 200.1104 (ESI+).

2,5-Bis(ethylthio)-1H-pyrrole (5c)
GP3: FCC (20% CH2Cl2 in hexanes) gave the bis title compound as a beige solid (25 mg, 30%), bis 5c as a brown solid (10 mg, 12%), and tris 5c as a black solid (2 mg, <5%). 1H NMR (500 MHz, CDCl3): δ 8.19 (1H, br s), 6.33 (2H, d, J = 2.5 Hz), 2.66 (4H, q, J = 7 Hz), 1.22 (6H, t, J = 7.5 Hz). 13C
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NMR (125 MHz, CDCl$_3$): $\delta$ 122.0 (s x2), 118.1 (d x2), 32.0 (t x2), 15.5 (q x2). HRMS m/z calc. for $\text{C}_8\text{H}_{13}\text{NS}_2$: 187.0489 (186.0411 for M-H); Found: 186.0417 (ESI-).

2,3-Bis(ethylthio)-1H-pyrrole (5c$_2$)
GP3: $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.27 (1H, br s), 6.81 (1H, dd, $J = 3, 3$ Hz), 6.31 (1H, dd, $J = 3, 3$ Hz), 2.81 (2H, q, $J = 7$ Hz), 2.77 (2H, q, $J = 7$ Hz), 1.25 (3H, t, $J = 7$ Hz), 1.20 (3H, t, $J = 7$ Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 122.3 (s), 120.7 (s), 120.0 (d), 114.5 (d), 31.5 (t), 30.4 (d), 15.4 (q), 15.1 (q). HRMS m/z calc. for $\text{C}_8\text{H}_{13}\text{NS}_2$: 187.0489 (186.0411 for M-H); Found: 186.0417 (ESI-).

2,3,4-Tris(ethylthio)-1H-pyrrole (5c$_3$)
GP3: $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.26 (1H, br s), 6.41 (1H, d, $J = 2.5$ Hz), 2.80 (2H, q, $J = 7$ Hz), 2.79 (2H, q, $J = 7$ Hz), 2.72 (2H, q, $J = 7$ Hz), 2.72 (2H, q, $J = 7$ Hz), 2.72 (2H, q, $J = 7$ Hz), 1.25 (3H, t, $J = 7.5$ Hz), 1.22 (3H, t, $J = 7.5$ Hz), 1.21 (3H, t, $J = 7.5$ Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 124.6 (s), 122.0 (s), 121.9 (s), 121.6 (d), 31.9 (t), 31.4 (t), 30.3 (t), 15.1 (q). HRMS m/z calc. for $\text{C}_{10}\text{H}_{17}\text{NS}_3$: 247.0523 (246.0445 for M-H); Found: 246.0450 (ESI-).

Benzyl 4-(decylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2d)
GP4: Reaction stirred for 6 h; FCC (20-50% EtOAc in hexanes) gave the title compound as a white solid (95 mg, 54%). $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.79 (1H, br s), 7.44-7.33 (5H, m), 5.30 (2H, s), 2.47 (2H, t, $J = 7.5$ Hz), 2.39 (3H, s), 2.35 (3H, s), 1.49-1.41 (2H, m), 1.39-1.18 (14H, m), 0.88 (3H, t, $J = 7.5$ Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 160.8 (s), 137.4 (s), 136.6 (s), 133.0 (s), 128.8 (d x2), 128.4 (d x3), 117.5 (s), 113.5 (s), 66.0 (t), 36.7 (t), 32.1 (t), 29.9 (t), 29.8 (t x2), 29.5 (t x2), 28.9 (t), 22.9 (t), 14.3 (q), 12.3 (q), 11.7 (q). HRMS m/z calc. for $\text{C}_{24}\text{H}_{35}\text{NO}_2\text{S}$: 401.2389 (424.2286 for M+Na); Found: 424.2281 (ESI+).

Ethyl 4-(decylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3d)
GP3: Reaction stirred for 3 h; FCC (20% EtOAc in hexanes) gave the title compound as a white solid (142 mg, >95%). $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.87 (1H, br s), 4.31 (2H, q, $J = 7$ Hz), 2.48 (2H, t, $J = 7.5$ Hz), 2.39 (3H, s), 2.33 (3H, s), 1.49-1.41 (2H, m), 1.39-1.18 (14H, m), 0.88 (3H, t, $J = 7.5$ Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 161.7 (s), 137.1 (s), 132.3 (s), 117.8 (s), 113.3 (s), 60.2 (q), 36.7 (t), 32.1 (t), 29.9 (t), 29.8 (t x2), 29.5 (t x2), 28.9 (t), 22.9 (t), 14.8 (q), 14.3 (q), 12.3 (q), 116 (q). HRMS m/z calc. for $\text{C}_{19}\text{H}_{33}\text{NO}_2\text{S}$: 339.2232 (362.2130 for M+Na); Found: 362.2124 (ESI+).

2-(Decylthio)-4-ethyl-3,5-dimethyl-1H-pyrrole-2-carboxylate (4d)
GP3: FCC (20% CH$_2$Cl$_2$ in hexanes) gave the title compound as a black solid (122 mg, 95%). $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 7.56 (1H, br s), 2.52 (2H, t, $J = 7$ Hz), 2.36 (2H, q, $J = 7$ Hz), 2.16 (3H, s), 2.01
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(3H, s), 1.59-1.48 (2H, m), 1.42-1.18 (14H, m), 1.06 (3H, t, J = 7.5 Hz), 0.88 (3H, t, J = 7.5 Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 125.3 (s), 124.6 (s), 122.2 (s), 113.5 (s), 38.1 (t), 32.1 (t), 30.3 (t), 29.8 (t x2), 29.54 (t), 29.51 (t), 28.9 (t), 22.9 (t), 18.3 (t), 15.6 (q), 14.3 (q), 11.4 (q), 10.2 (q). HRMS m/z calc. for C$_{14}$H$_{33}$NS: 295.2334 (318.2231 for M+Na); Found: 318.2226 (ESI+).

2-(Decylthio)-1H-pyrrole (5d)

GP3: FCC (20% CH$_2$Cl$_2$ in hexanes) gave a 10:1 mixture of bis 5d and tris 5d (54 mg) and a 2.5:1.0 mixture of the title mono 5d and bis 5d (35 mg). $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.19 (1H, br s), 6.84-6.80 (1H, m), 6.38-6.34 (1H, m), 2.62 (2H, t, J = 7.5 Hz), 1.59-1.49 (3H, m), 1.41-1.18 (13H, m), 0.88 (3H, t, J = 7.5 Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 120.3 (s), 119.6 (s), 116.5 (s), 110.2 (s), 38.2 (t), 32.1 (t), 30.2 (t), 29.8 (t), 29.7 (t), 29.5 (t), 29.4 (t), 28.7 (t), 22.9 (t), 14.3 (q). HRMS m/z calc. for C$_{14}$H$_{25}$NS: 239.1708 (238.1629 for M-H); Found: 238.1635 (ESI-).

2,5-Bis(decylthio)-1H-pyrrole (5d$_2$)

GP3: $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.14 (1H, br s), 6.30 (2H, d, J = 2.5 Hz), 2.64 (4H, t, J = 7.5 Hz), 1.62-1.52 (4H, m), 145-1.20 (28H, m), 0.88 (6H, t, J = 7.5 Hz). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 122.3 (s x2), 117.8 (d x2), 38.1 (t x2), 32.1 (t x2), 30.2 (t x2), 29.78 (t x2), 29.76 (t x2), 29.4 (t x2), 28.7 (t x2), 22.9 (t x2), 14.3 (t x2). HRMS m/z calc. for C$_{24}$H$_{45}$NS$_2$: 411.2993 (410.2915 for M-H); Found: 410.2921 (ESI-).

2,3-Bis(decylthio)-1H-pyrrole (5d$_2'$)

GP3: $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.23 (1H, br s), 6.78 (1H, dd, J = 3, 3 Hz), 6.28 (1H, dd, J = 3, 3 Hz), 2.74 (2H, t, J = 7 Hz), 2.69 (2H, t, J = 7 Hz), 1.65-1.17 (32H, m), 0.88 (6H, m). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 122.3 (s), 120.7 (s), 119.9 (d), 114.3 (d), 37.5 (t), 36.5 (t), 32.1 (t x2), 30.3 (t), 29.9 (t), 29.81 (t x2), 29.8 (t x2), 29.55 (t x2), 29.51 (t x2), 29.47 (t), 29.0 (t), 28.9 (t), 22.9 (t), 14.3 (q). HRMS m/z calc. for C$_{24}$H$_{45}$NS$_2$: 411.2993 (410.2915 for M-H); Found: 410.2921 (ESI-).

2,3,4-Tris(decylthio)-1H-pyrrole (5d$_3$)

GP3: $^1$H NMR (500 MHz, CDCl$_3$): $\delta$ 8.18 (1H, br s), 6.37 (1H, d, J = 2.5 Hz), 2.77 (2H, t, J = 7.5 Hz), 2.74 (2H, t, J = 7.5 Hz), 2.68 (2H, t, J = 7.5 Hz), 1.53-1.51 (8H, m), 1.30-1.24 (43, m), 0.90-0.85 (6H, m). $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 131.2 (s), 122.7 (s x2), 121.1 (d), 37.9 (t), 37.3 (t), 36.0 (t), 32.1 (t), 30.3 (t), 30.2 (t), 29.9 (t), 29.86 (t), 29.82 (t x4), 29.80 (t x4), 29.6 (t), 29.56 (t x4), 29.51 (t), 29.47 (t), 29.44 (t), 29.0 (t), 28.9 (t), 28.7 (t), 22.9 (q), 14.3 (q x2). HRMS m/z calc. for C$_{34}$H$_{65}$NS$_3$: 583.4279 (582.4201 for M-H); Found: 582.4206 (ESI-).
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Benzyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2f)

GP3: FCC (10% EtOAc in hexanes) gave the title compound as a white solid (143 mg, 89%). ¹H NMR (500 MHz, CDCl₃): δ 9.18 (1H, br s), 7.47-7.30 (5H, m), 6.99-6.93 (2H, m), 6.78-6.73 (2H, m), 5.29 (2H, s), 3.74 (3H, s), 2.32 (3H, s), 2.30 (3H, s). ¹³C NMR (125 MHz, CDCl₃): δ 161.4 (s), 157.8 (s), 138.3 (s), 136.5 (s), 133.1 (s), 129.7 (s), 128.8 (d x3), 128.42 (d x2), 128.37 (d x2), 118.0 (s), 114.8 (d x2), 111.5 (s), 66.1 (t), 55.6 (q), 12.2 (q), 11.6 (q). HRMS m/z calc. for C₂₁H₂₁NO₃S: 367.1242 (390.1140 for M+Na); Found: 390.1134 (ESI+).

Ethyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3f)

GP3: FCC (10% EtOAc in hexanes) gave the title compound as a white solid (130 mg, >95%). ¹H NMR (500 MHz, CDCl₃): δ 9.00 (1H, br s), 6.98-6.95 (2H, m), 6.77-6.75 (2H, m), 4.32 (2H, q, J = 7 Hz), 3.75 (3H, s), 2.30 (3H, s), 2.17 (3H, s), 1.37 (3H, t, J = 7.5 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 161.7 (s), 157.8 (s), 137.8 (s), 132.5 (s), 129.9 (s), 127.9 (d x2), 118.4 (s), 115.0 (d x2), 111.3 (s), 60.4 (t), 55.6 (q), 14.8 (q), 12.2 (q), 11.5 (q). HRMS m/z calc. for C₁₆H₁₉NO₃S: 305.1086 (328.0983 for M+Na); Found: 328.0978 (ESI+).

3-Ethyl-5-(4-methoxyphenylthio)-2,4-dimethyl-1H-pyrrole (4f)

GP3: FCC (10% EtOAc in hexanes) gave the title compound as a purple solid (118 mg, >95%). ¹H NMR (500 MHz, CDCl₃): δ 7.63 (1H, br s), 6.97-6.94 (2H, m), 6.79-6.76 (2H, m), 3.75 (2H, q, J = 7 Hz), 2.41 (2H, q, J = 7 Hz), 2.17 (3H, s), 2.08 (3H, s), 1.08 (3H, t, J = 7.5 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 158.0 (s), 130.6 (s), 127.8 (d x2), 126.7 (s), 126.2 (s), 114.8 (d x2), 110.7 (s), 55.6 (q), 18.3 (t), 15.7 (q), 11.5 (q), 10.1 (q). HRMS m/z calc. for C₁₅H₁₉NOS: 261.1187 (260.1109 for M-H); Found: 260.1104 (ESI-).

2-(4-Methoxyphenylthio)-1H-pyrrole (5f)

GP3: FCC (20-50% CH₂Cl₂ in hexanes) gave the title mono 5f as a brown oil (32 mg, 62%) and bis 5f₂ as a beige solid (48 mg, 10%). ¹H NMR (500 MHz, CDCl₃): δ 8.25 (1H, br s), 7.08-7.05 (2H, m), 6.90-6.87 (1H, m), 6.80-6.76 (2H, m), 6.54-6.52 (1H, m), 6.29-6.26 (1H, m), 3.76 (3H, s). ¹³C NMR (125 MHz, CDCl₃): δ 158.5 (s), 129.3 (s), 129.0 (d x2), 121.6 (d), 117.9 (d), 117.8 (s), 114.9 (d x2), 110.4 (d), 55.6 (q). HRMS m/z calc. for C₁₆H₁₉NOS: 205.0561 (204.0483 for M-H); Found: 204.0489 (ESI-).

2-(4-Methoxybenzyl)-5-(4-methoxyphenylthio)-1H-pyrrole (5f₂)

GP3: ¹H NMR (500 MHz, CDCl₃): δ 8.24 (1H, br s), 7.11-7.09 (4H, m), 6.80-6.78 (4H, m), 6.6 (2H, d, J = 2.5 Hz), 3.77 (6H, s). ¹³C NMR (125 MHz, CDCl₃): δ 158.8 (s x2), 129.8 (d x4), 128.1 (s x2), 121.9 (s...
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Ethyl 2,4-dimethyl-5-(phenylthio)-1H-pyrrole-3-carboxylate (6a)
GP3: FCC (20% EtOAc in hexanes) gave the title compound as a beige solid (105 mg, 88%). ¹H NMR (500 MHz, CDCl₃): δ 8.35-8.18 (1H, br s), 7.24-7.16 (2H, m), 7.13-7.05 (1H, m), 7.00-6.92 (2H, m), 4.28 (2H, q, J = 7 Hz), 2.50 (3H, s), 2.32 (3H, s), 1.35 (3H, t, J = 7 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 165.9 (s), 138.5 (s), 138.4 (s), 130.6 (s), 129.1 (d x2), 125.7 (d x2), 125.5 (d), 112.7 (s), 112.2 (s), 59.6 (t), 14.6 (q), 14.4 (q), 12.2 (q). HRMS m/z calc. for C₁₈H₁₇NO₂S: 343.0701 (342.0622 for M-H); Found: 342.0628 (ESI-).

1-(2,4-Dimethyl-5-(phenylthio)-1H-pyrrol-3-yl)heptane-1,6-dione (7a)
GP3: FCC (40% EtOAc in hexanes) gave the title compound as a beige solid (148 mg, >95%). ¹H NMR (500 MHz, CDCl₃): δ 8.65-8.35 (1H, br s), 7.25-7.17 (2H, m), 7.13-7.06 (1H, m), 7.00-6.94 (2H, m), 2.76 (2H, t, J = 7 Hz), 2.51 (3H, s), 2.47 (2H, t, J = 7 Hz), 2.35 (3H, s), 2.13 (3H, s), 1.76-1.59 (4H, m). ¹³C NMR (125 MHz, CDCl₃): δ 209.2 (s), 197.4 (s), 138.2 (s), 137.8 (s), 129.2 (d x2), 128.9 (s), 125.7 (d x2), 125.6 (d), 122.3 (s), 112.9 (s), 43.8 (t), 42.2 (t), 30.0 (q), 23.75 (t), 23.74 (t), 15.4 (q), 13.3 (q). HRMS m/z calc. for C₁₉H₂₃NO₂S: 329.1449 (352.1347 for M+Na); Found: 352.1342 (ESI+).

3-(Phenylthio)-1H-pyrrole-2-carbaldehyde (8a)
GP4: Reaction stirred for 3 h; PTLC (20% EtOAc in hexanes) gave the title compound as a beige solid (32 mg, 36%). ¹H NMR (500 MHz, CDCl₃): δ 10.50-10.10 (1H, br s), 9.52 (1H, s), 7.32-7.29 (1H, m), 7.27-7.10 (5H, m), 7.10-7.08 (1H, m). ¹³C NMR (125 MHz, CDCl₃): δ 179.5 (d), 138.8 (s), 133.4 (s), 131.7 (d), 129.1 (d x2), 126.9 (d x2), 126.6 (d), 125.7 (d), 113.8 (s). HRMS m/z calc. for C₁₁H₉NOS: 203.0405 (202.0327 for M-H); Found: 202.0332 (ESI-).

(R)-1,1'-Binaphthyl-2,2'-diyl bis(2-(2,4-dimethyl-5-(phenylthio)-1H-pyrrol-3-yl)acetate) (9a)
GP3: Pyrrole 8 (50 mg, 0.089 mmol); 2-(phenylthio)isoindoline-1,3-dione (50 mg, 0.20 mmol); MgBr₂ (ca. 1 mg); FCC (20% EtOAc in hexanes) gave the title compound as a beige solid (46 mg, 67%). ¹H NMR (500 MHz, CDCl₃): δ 7.94 (2H, d, J = 9 Hz), 7.88 (2H, d, J = 8 Hz), 7.47-7.43 (2H, br s), 7.42-7.37 (2H, m), 7.34 (2H, d, J = 9 Hz), 7.23-7.17 (2H, m), 7.17-7.11 (6H, m), 7.07-7.00 (2H, m), 6.92-6.85 (4H, m), 3.21 (2H, ap d, J = 15.5 Hz), 3.16 (2H, ap d, J = 15.5 Hz), 1.71 (6H, s), 1.66 (6H, s). ¹³C NMR (125 MHz, CDCl₃): δ 169.9 (s x2), 146.9 (s x2), 139.8 (s x2), 133.4 (s x2), 131.6 (s x2), 129.5 (d x2), 129.2 (s x2), 128.9 (d x4), 128.0 (d x2), 127.4 (s x2), 126.7 (d x2), 126.2 (d x2), 125.7 (d x2), 125.3
Preparation of sulfenyl pyrroles

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(d x4), 125.0 (d x2), 123.5 (s x2), 121.7 (d x2), 111.8 (s x2), 109.3 (s x2), 30.7 (t x2), 11.0 (q x2), 9.5 (q x2). HRMS m/z calc. for C_{48}H_{40}N_{2}O_{4}S_{2}: 772.2429 (795.2327 for M+Na); Found: 795.2322 (ESI+).

4-Benzencesulfinyl-3,5-dimethyl-1H-pyrrole-2-carboxylic acid ethyl ester (10)

GP3: Reaction stirred for 3 h; pyrrole 3 (50 mg, 0.30 mmol); 2-benzencesulfinyl-isoindole-1,3-dione (89 mg, 0.329 mmol); MgBr₂ (28 mg, 0.150 mmol); FCC (80% CH₂Cl₂ in hexanes) gave the title compound as a pale yellow solid (22 mg, 25%) and starting material (22 mg, 45%). ¹H NMR (500 MHz, CDCl₃): δ 9.10 (1H, br s), 7.26-7.18 (2H, m), 7.13-7.05 (2H, m), 7.04-6.97 (1H, m), 4.38 (2H, q, J = 7 Hz), 2.31 (3H, s), 2.30 (3H, s), 1.38 (3H, t, J = 7.5 Hz). ¹³C NMR (125 MHz, CDCl₃): δ 161.5 (s), 139.3 (s), 138.1 (s), 132.6 (s), 129.0 (d x2), 125.5 (d x2), 124.8 (d), 118.5 (s), 109.7 (s), 60.4 (t), 14.7 (q), 12.2 (q), 11.4 (q). HRMS m/z calc. for C_{15}H_{17}NO₃S: 291.0929 (314.0827 for M+Na); Found: 314.0821 (ESI+).
Preparation of sulfenyl pyrroles

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$^{13}$C NMR Spectra

2-(Phenylthio)isoindoline-1,3-dione (1a)
Preparation of sulfenyl pyrroles
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2-(Benzylthio)isoindoline-1,3-dione (1b)
Preparation of sulfenyl pyrroles
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2-(Ethylthio)isoindoline-1,3-dione (1c)
Preparation of sulfenyl pyrroles
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2-(Decylthio)isoindoline-1,3-dione (1d)
Preparation of sulfenyl pyrroles
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2-(-Butylthio)isoindoline-1,3-dione (1e)
Preparation of sulfenyl pyrroles
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2-(4-Methoxyphenyl)isoindoline-1,3-dione (1f)
Preparation of sulfenyl pyrroles
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Benzyl 3,5-dimethyl-4-(phenylthio)-1H-pyrrole-2-carboxylate (2a)
Preparation of sulfenyl pyrroles

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Ethyl 3,5-dimethyl-4-(phenylthio)-1H-pyrrole-2-carboxylate (3a)
Preparation of sulfenyl pyrroles

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3-Ethyl-2,4-dimethyl-5-(phenylthio)-1H-pyrrole (4a)
Preparation of sulfenyl pyrroles
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2-(Phenylthio)-1H-pyrrole (5a)
2,5-Bis(phenylthio)-1H-pyrrole (5a)
Preparation of sulfenyl pyrroles
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Benzyl 4-(benzylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2b)
Preparation of sulfenyl pyrroles
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Ethyl 4-(benzylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3b)
Preparation of sulfenyl pyroles

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2-(Benzylsulfinyl)-4-ethyl-3,5-dimethyl-1H-pyrrole (4b)
Preparation of sulfenyl pyrroles
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2-(Benzylthio)-1H-pyrrole (5b)
Preparation of sulfenyl pyrroles
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2,5-Bis(benzylthio)-1H-pyrrole (5b.)
Preparation of sulfenyl pyrroles
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Benzyl 4-(ethylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2c)
Preparation of sulfenyl pyrroles

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Ethyl 4-(ethylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3c)
Preparation of sulfenyl pyrroles

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3-Ethyl-5-(ethylsulfinyl)-2,4-dimethyl-1H-pyrrole (4c)
Preparation of sulfenyl pyrroles

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2,5-Bis(ethylthio)-1H-pyrrole (5c)
Preparation of sulfenyl pyrroles

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2,3-Bis(ethylthio)-1H-pyrrole(5c₂)

Preparation of sulfenyl pyrroles
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2,3,4-Tris(ethylthio)-1H-pyrrole (5c,)

![Graph or Diagram]
Preparation of sulfenyl pyroles
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Benzyl 4-(decylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2d)
Preparation of sulfenyl pyrroles
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Ethyl 4-(decylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3d)
Preparation of sulfenyl pyrroles
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2-(Decylthio)-4-ethyl-3,5-dimethyl-1H-pyrrole (4d)
Preparation of sulfenyl pyrroles
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2-(Decylthio)-1H-pyrrole (5d)
Preparation of sulfenyl pyrroles
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2,5-Bis(decylthio)-1H-pyrrole (5d₂)
Preparation of sulfenyl pyrroles

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2,3-Bis(decylthio)-1H-pyrrole (5d$_2$)
Preparation of sulfenyl pyrroles
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2,3,4-Tris(decylthio)-1H-pyrrole (5d,)
Benzyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (2f)
Preparation of sulfenyl pyrroles
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Ethyl 4-(4-methoxyphenylthio)-3,5-dimethyl-1H-pyrrole-2-carboxylate (3f)
Preparation of sulfenyl pyrroles
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3-Ethyl-5-(4-methoxyphenylthio)-2,4-dimethyl-1H-pyrrole (4f)
Preparation of sulfenyl pyrroles
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2-(4-Methoxyphenylthio)-1H-pyrrole (5f)
2-(4-Methoxybenzyl)-5-(4-methoxyphenylthio)-1$H$-pyrrole (5f)
Preparation of sulfenyl pyrroles
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Ethyl 2,4-dimethyl-5-(phenylthio)-1H-pyrrole-3-carboxylate (6a)
Preparation of sulfenyl pyrroles

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1-(2,4-Dimethyl-5-(phenylthio)-1H-pyrrol-3-yl)heptane-1,6-dione (7a)
Preparation of sulfenyl pyrroles
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3-(Phenylthio)-1H-pyrrole-2-carbaldehyde (8a)
Preparation of sulfenyl pyrroles
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(R)-1,1'-Binaphthyl-2,2'-diyl bis(2-(2,4-dimethyl-5-(phenylthio)-1H-pyrrol-3-yl)acetate) (9a)
Preparation of sulfenyl pyrroles

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4-Benzensulfinyl-3,5-dimethyl-1H-pyrrole-2-carboxylic acid ethyl ester (10)
Preparation of sulfenyl pyrroles
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References


