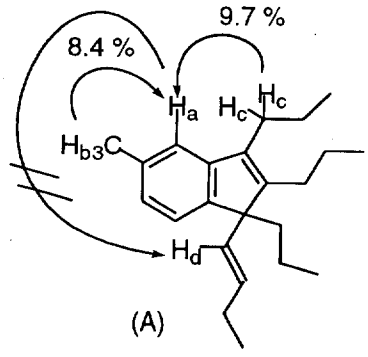
1-[(*E*)-1-Butenyl]-5-methyl-1,2,3-tripropyl indene (24a): ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.03-6.99 (m, 2H), 6.93-6.90 (m, 1H), 5.59 (dt, J = 15.6, 6.6 Hz, 1H), 5.09 (d, J = 15.6 Hz, 1H), 2.45 (t, J = 7.6 Hz, 2H), 2.37 (s, 3H), 2.26-2.18 (m, 1H), 2.12-1.76 (m, 5H), 1.64-1.42 (m, 4H), 0.98 (t, J = 7.4 Hz, 3H), 0.95 (t, J = 7.4 Hz, 3H), 0.93 (t, J = 7.4 Hz, 3H), 0.80-0.68 (m, 1H), 0.70 (t, J = 7.0 Hz, 3H), 0.66-0.54 (m, 1H); ^{13}C-NMR (75.5 MHz, $CDCl_3$) δ 148.7, 147.1, 145.8, 137.1, 135.7, 133.0, 129.5, 124.7, 122.1, 119.2, 59.5, 35.9, 28.4, 27.8, 25.9, 23.1, 22.2, 21.6, 16.7, 14.9, 14.5, 14.4, 14.0. IR (neat) 2959, 2932, 2870, 1456, 970 cm^{-1}. MS (EI) m/z 310 (M^+, 69.4), 267 (M^+- Pr, 100). HRMS calcd for $C_{23}H_{34}$ 310.2660, found 310.2630.



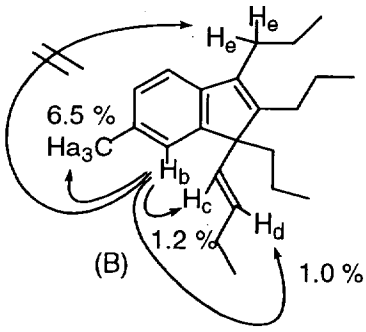
The structure of **24a** was confirmed by the NOE experiments shown in (A). There was a NOE between H_a and H_b, and H_a and H_c, but there was no NOE between H_a and H_d.

1-[(*E*)-1-Hexenyl]-5-methy-1,2,3-tripentyl indene (24b): ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.00-6.97 (m, 2H), 6.92-6.89 (m, 1H), 5.53 (dt, J = 15.6, 6.7 Hz, 1H), 5.08 (d,

J = 15.6 Hz, 1H), 2.46 (t, J = 7.8 Hz, 2H), 2.37 (s, 3H), 2.27-2.20 (m, 1H), 2.10-1.75 (m, 5H), 1.58-1.53 (m, 2H), 1.48-1.27 (m, 14H), 1.18-1.06 (m, 4H), 0.92-0.86 (m, 10H), 0.78 (t, J = 7.0 Hz, 3H), 0.57-0.50 (m, 1H); ^{13}C-NMR (75.5 MHz, $CDCl_3$) δ 148.5, 147.0, 145.8, 137.2, 135.6, 134.1, 124.7, 122.1, 119.1, 59.4, 33.4, 32.6, 32.2, 31.8, 28.7, 26.1, 25.7, 22.9, 22.6, 22.5, 22.4, 22.2, 21.6, 21.5, 14.0. IR (KBr) 2957, 2930, 2858, 1466, 972, 812 cm^{-1}. MS (EI) m/z 422 (M^+, 100), 351 (M^+- pentyl, 80.0). HRMS calcd for $C_{31}H_{50}$ 422.3913, found 422.3942.

1-[(*E*)-1-Butenyl]-6-methyl-1,2,3-tripropyl indene (25a): ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.08 (d, J = 7.6 Hz, 1H), 7.00 (d, J = 7.6 Hz, 1H), 6.95 (s, 1H), 5.60 (dt, J = 15.6, 6.3 Hz, 1H), 5.08 (dt, J = 15.6, 1.5 Hz, 1H), 2.45 (dd, J = 7.6 Hz, 2H), 2.35 (s, 3H), 2.26-2.18 (m, 1H), 2.10-1.97 (m, 3H), 1.92-1.75 (m, 2H), 1.63-1.41 (m, 4H), 0.96 (t, J = 7.3 Hz, 3H), 0.95 (t, J = 7.3 Hz, 3H), 0.94 (t, J = 7.3 Hz, 3H), 0.84-0.74 (m, 1H), 0.73 (t, J = 7.1 Hz, 3H), 0.61-0.50 (m, 1H); ^{13}C-NMR (75.5 MHz, $CDCl_3$) δ 150.2, 147.2, 143.0, 137.1, 133.5, 133.0, 129.5, 126.8, 123.3, 118.0, 59.6, 35.8, 28.3, 27.8, 25.9, 23.1, 22.1, 21.5, 16.6, 14.9, 14.5, 14.4, 14.0. IR (neat) 2960, 2932, 2872, 1456, 972 cm^{-1}. MS (EI)

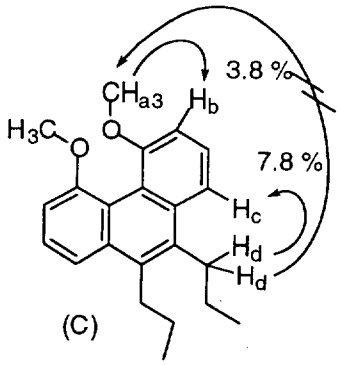
m/z 310 (M^+, 63.1), 267 (M^+- Pr, 100). HRMS calcd for $C_{23}H_{34}$ 310.2661, found 310.2668.

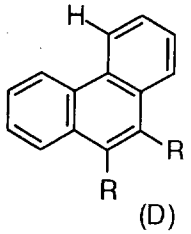


The structure of **25a** was confirmed by the NOE experiments shown in (B). There was a NOE between H_b and H_a, H_b and H_c, and H_b and H_d but there was no NOE between H_b and H_e.

4,5-Dimethoxy-9,10-dipropyl phenanthrene (33): ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.62 (d, J = 8.0 Hz, 2H), 7.51 (t, J = 8.0 Hz, 2H), 7.04 (d, J = 8.0 Hz, 2H), 3.09-3.03 (m, 4H), 1.78-1.65 (m, 4H), 1.14 (t, J = 7.2 Hz, 6H); ^{13}C-NMR (75.5 MHz, $CDCl_3$) δ 157.7, 133.8, 133.7, 126.2, 118.6, 115.5, 106.5, 55.6, 31.6, 23.9, 14.8. IR (KBr) 2963, 2934, 2868, 1595, 1564, 1522, 1452, 1421, 1252, 1065, 783, 717 cm^{-1}. MS (EI) m/z 322 (M^+, 100), 293 (M^+- C_2H_5, 31.5). HRMS calcd for $C_{22}H_{26}O_2$ 322.1933, found 322.1923.

The structure of **33** was confirmed by the NOE experiments shown in (C). There was a rather strong NOE between H_a and H_b, and H_c and H_d, but there was no NOE between H_a and H_d. Further, it is well accepted that H of (D) appears around 8.0~9.0 ppm. However, such a signal was not observed in **33**.





1,5-Dimethoxy-9,10-dipropyl phenanthrene (34): ^{1}H NMR (300 MHz, $CDCl_3$) δ 9.28 (dd, J = 8.4, 1.0 Hz, 1H), 7.71 (dd, J = 8.4, 1.0 Hz, 1H), 7.51 (dd, J = 8.4, 8.0 Hz, 1H), 7.44 (dd, J = 8.4, 8.0 Hz, 1H), 7.08 (d, J = 8.0 Hz, 1H), 7.05 (d, J = 8.0 Hz, 1H), 4.05 (s, 3H), 3.98 (s, 3H), 3.33-3.18 (m, 2H), 3.12-3.05 (m, 2H), 1.14 (t, J = 7.0 Hz, 3H), 1.09 (t, J = 7.0 Hz, 3H); ^{13}C-NMR (75.5 MHz, $CDCl_3$) δ 160.5, 160.4, 134.9, 134.4, 133.9, 126.4, 124.6, 121.2, 120.7, 117.2, 116.5, 107.9, 107.7, 100.5, 56.0, 55.7, 35.0, 31.8, 25.0, 23.9, 15.1, 14.9. IR (CCl_4) 2959, 2932, 2870, 1576, 1454, 1427, 1246, 908, 812 cm^{-1}. MS (EI) m/z 322 (M^+, 100), 293 (M^+- C_2H_5, 44.7). HRMS calcd for $C_{22}H_{26}O_2$ 322.1933, found 322.1924.

Observation of two different OMe signals in addition to the 1H signal at δ 9.28 clearly indicated that **34** has unsymmetrical structure, in contrast to the symmetrical structure of **33**.