

Chitosan Microspheres Supported Palladium Species as an Efficient and Recyclable Catalyst for Mizoroki-Heck reaction

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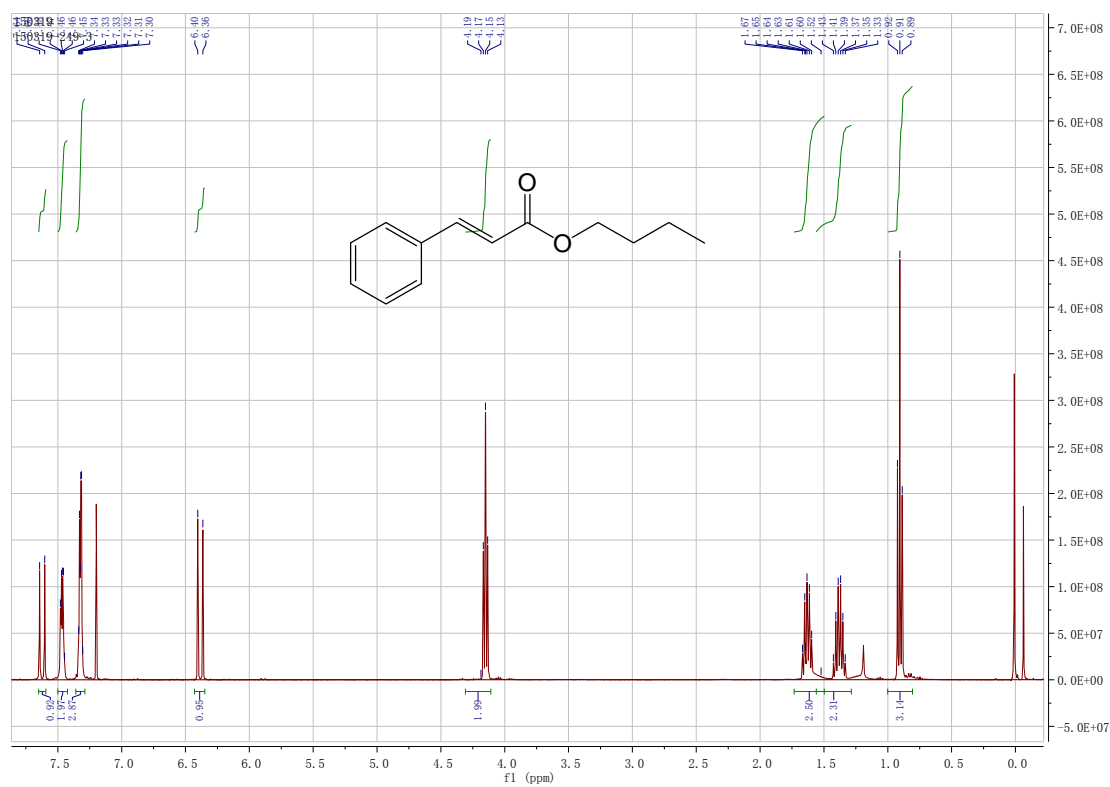
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¹H NMR data of the product of the Mizoroki-Heck reactionS2-13

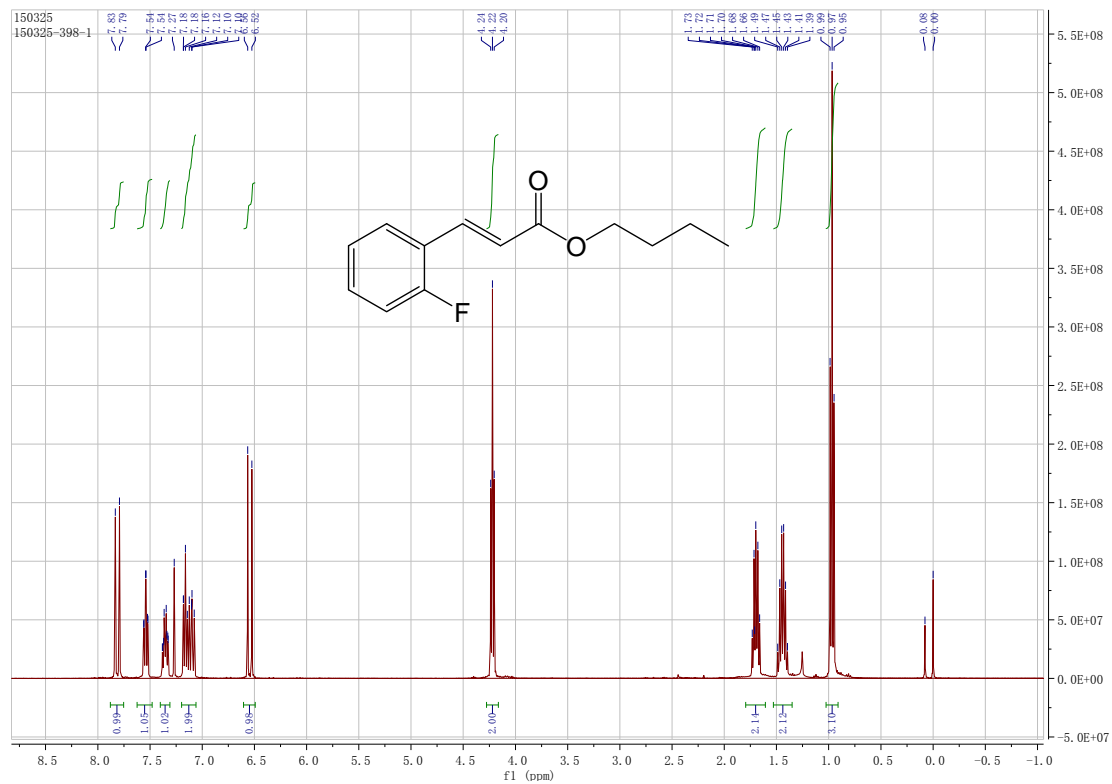
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Characterization data of the coupling products

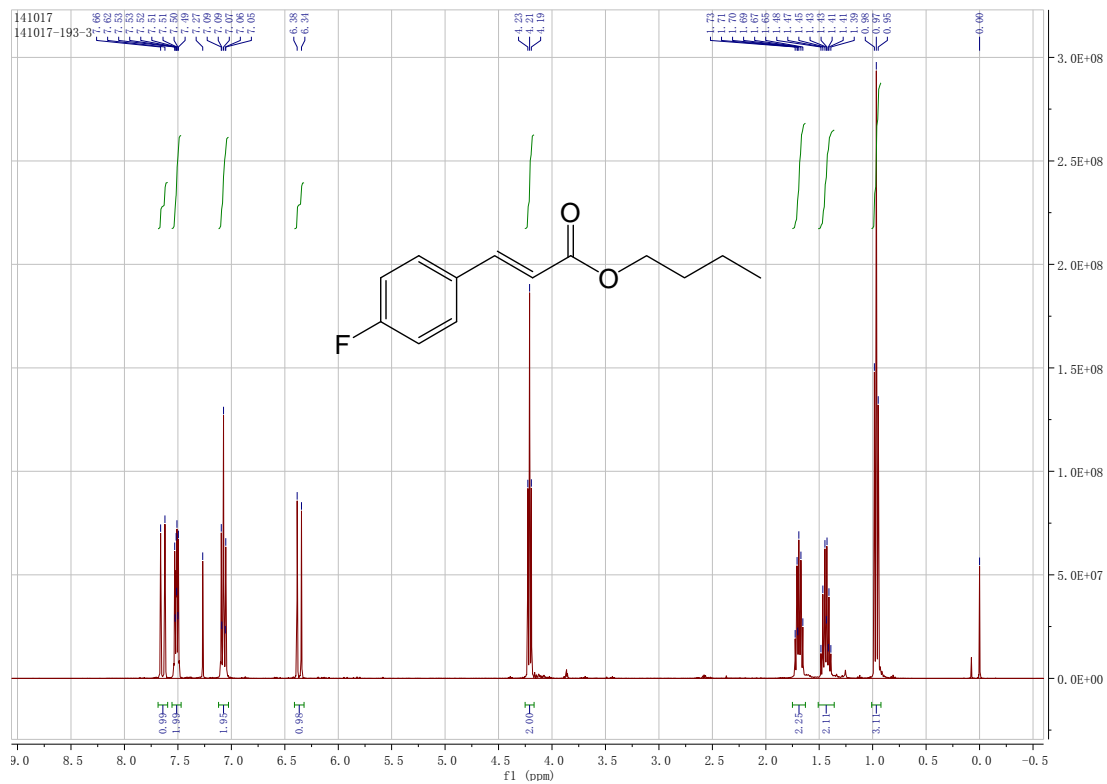
(*E*)-*n*-butyl cinnamate: ^1H NMR (400 MHz, CDCl_3) δ 7.62 (d, $J = 16.0$ Hz, 1H), 7.50 – 7.42 (m, 2H), 7.36 – 7.29 (m, 3H), 6.38 (d, $J = 16.0$ Hz, 1H), 4.31 – 4.11 (m, 2H), 1.73 – 1.50 (m, 3H), 1.56 – 1.29 (m, 2H), 0.91 (t, $J = 7.4$ Hz, 3H).



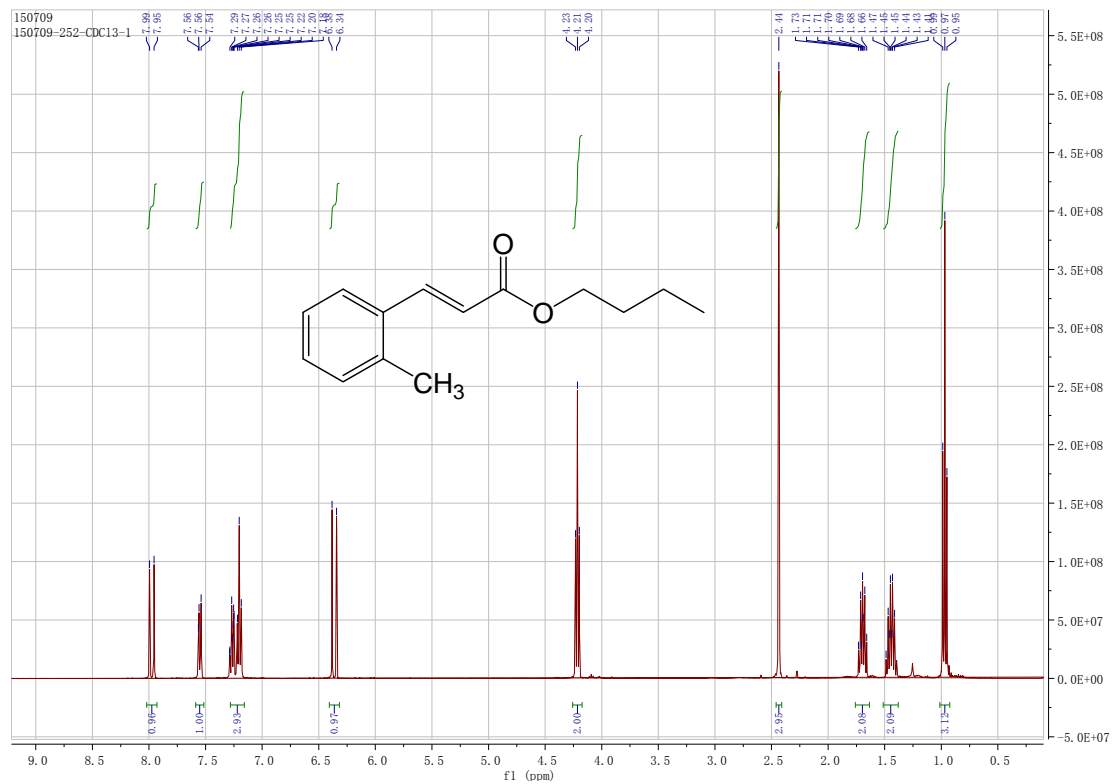
(*E*)-*n*-butyl 3-(2-fluorophenyl)acrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.81 (d, $J = 16.2$ Hz, 1H), 7.54 (td, $J = 7.6, 1.5$ Hz, 1H), 7.35 (ddd, $J = 15.3, 5.3, 1.7$ Hz, 1H), 7.20 – 7.06 (m, 2H), 6.54 (d, $J = 16.2$ Hz, 1H), 4.22 (t, $J = 6.7$ Hz, 2H), 1.70 (dt, $J = 14.6, 6.8$ Hz, 2H), 1.53 – 1.35 (m, 2H), 0.97 (t, $J = 7.4$ Hz, 3H).



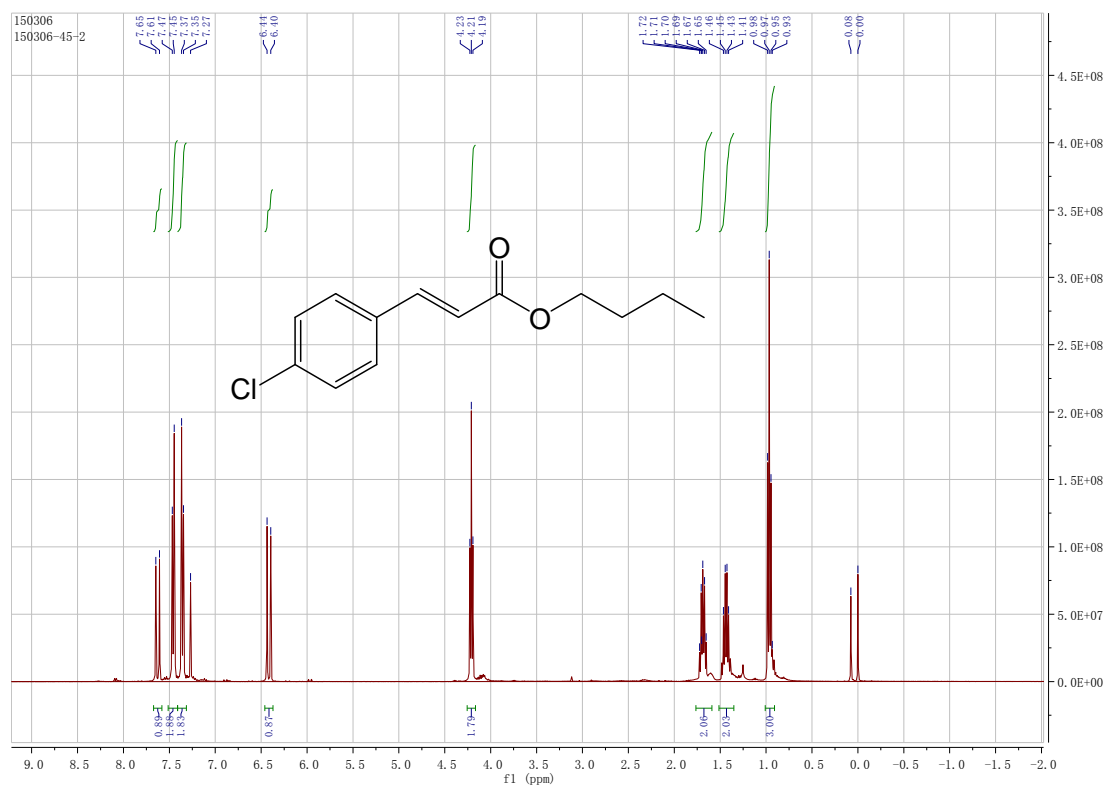
(*E*)-*n*-butyl 3-(4-fluorophenyl)acrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.64 (d, $J = 16.0$ Hz, 8H), 7.56 – 7.47 (m, 16H), 7.27 (s, 2H), 7.12 – 7.03 (m, 16H), 6.36 (d, $J = 16.0$ Hz, 8H), 4.21 (t, $J = 6.7$ Hz, 16H), 1.69 (dt, $J = 14.6, 6.8$ Hz, 18H), 1.51 – 1.36 (m, 17H), 0.97 (t, $J = 7.4$ Hz, 25H), 0.00 (s, 2H).



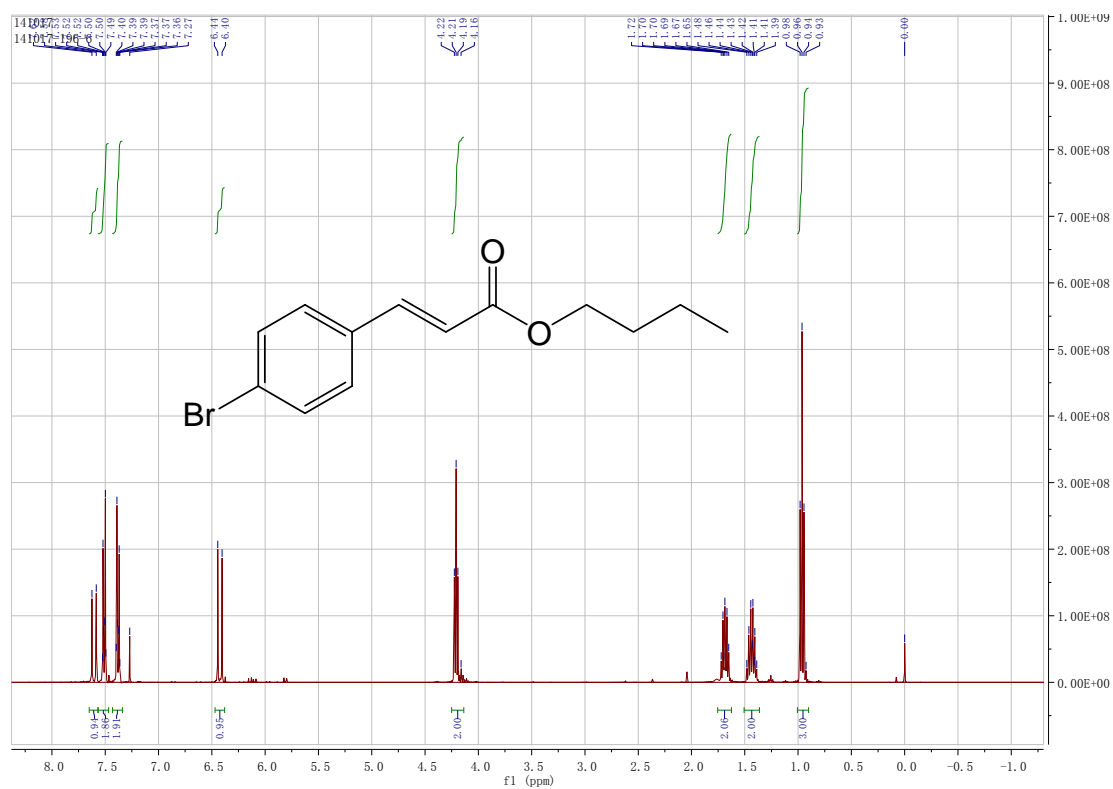
(*E*)-*n*-butyl 3-*o*-tolylacrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.97 (d, $J = 15.9$ Hz, 1H), 7.59 – 7.51 (m, 1H), 7.31 – 7.16 (m, 3H), 6.36 (d, $J = 15.9$ Hz, 1H), 4.21 (t, $J = 6.7$ Hz, 2H), 2.44 (s, 3H), 1.76 – 1.63 (m, 2H), 1.51 – 1.38 (m, 2H), 0.97 (t, $J = 7.4$ Hz, 3H).



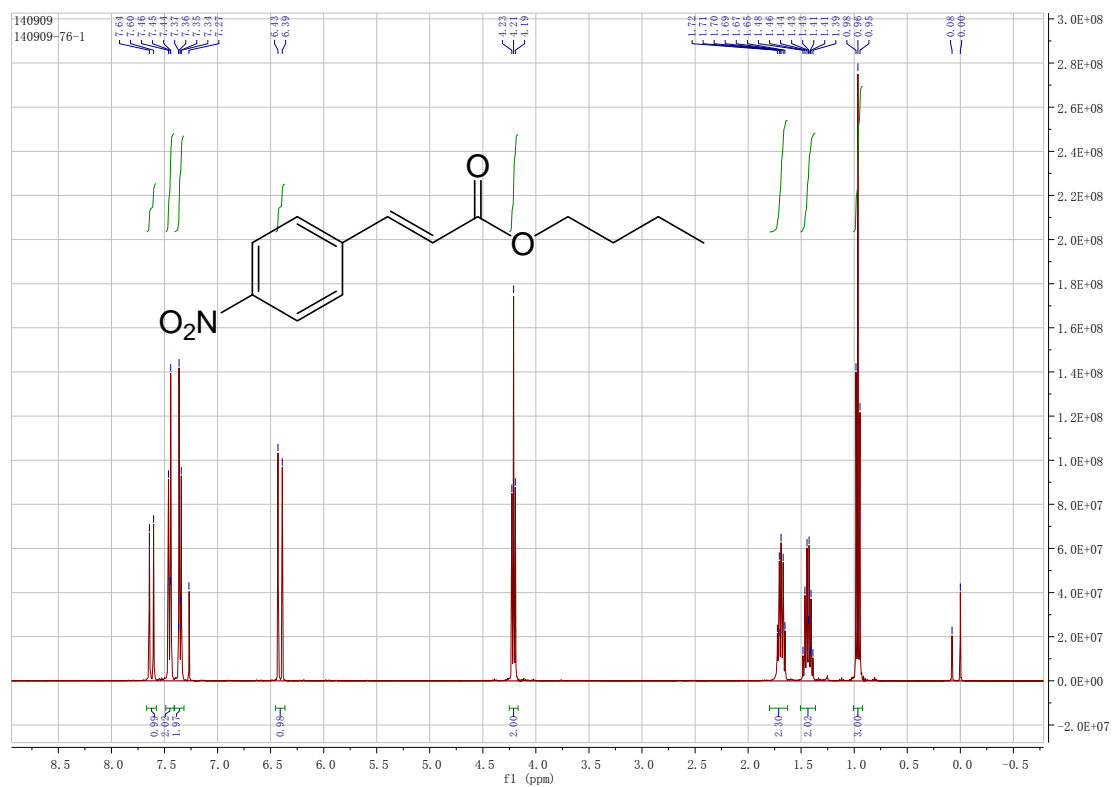
(*E*)-butyl 3-(4-chlorophenyl)acrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.63 (d, $J = 16.0$ Hz, 1H), 7.46 (d, $J = 8.5$ Hz, 2H), 7.36 (d, $J = 8.5$ Hz, 2H), 6.42 (d, $J = 16.0$ Hz, 1H), 4.21 (t, $J = 6.7$ Hz, 2H), 1.69 (dt, $J = 14.6, 6.8$ Hz, 2H), 1.44 (dd, $J = 15.1, 7.5$ Hz, 2H), 0.96 (dd, $J = 13.8, 6.4$ Hz, 3H).



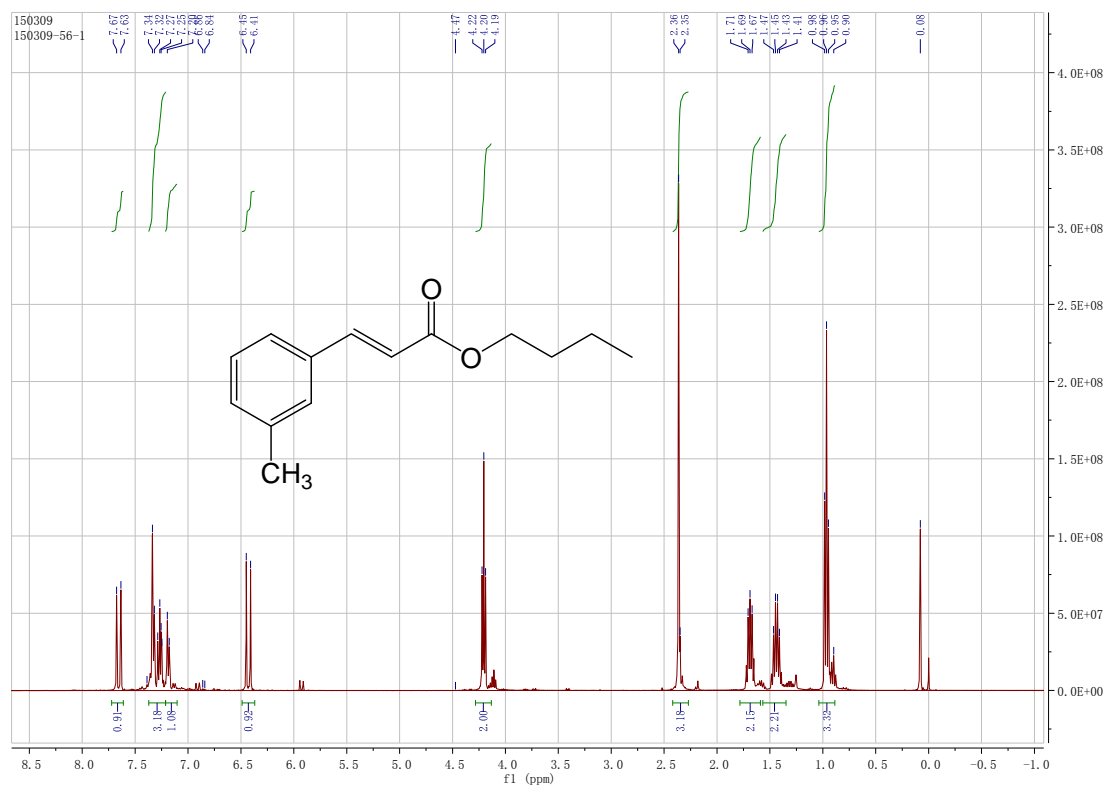
(*E*)-butyl 3-(4-bromophenyl)acrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.60 (d, $J = 16.0$ Hz, 1H), 7.57 – 7.47 (m, 2H), 7.43 – 7.34 (m, 2H), 6.42 (d, $J = 16.0$ Hz, 1H), 4.25 – 4.14 (m, 2H), 1.69 (dt, $J = 14.6, 6.8$ Hz, 2H), 1.51 – 1.36 (m, 2H), 0.95 (q, $J = 7.4$ Hz, 3H).



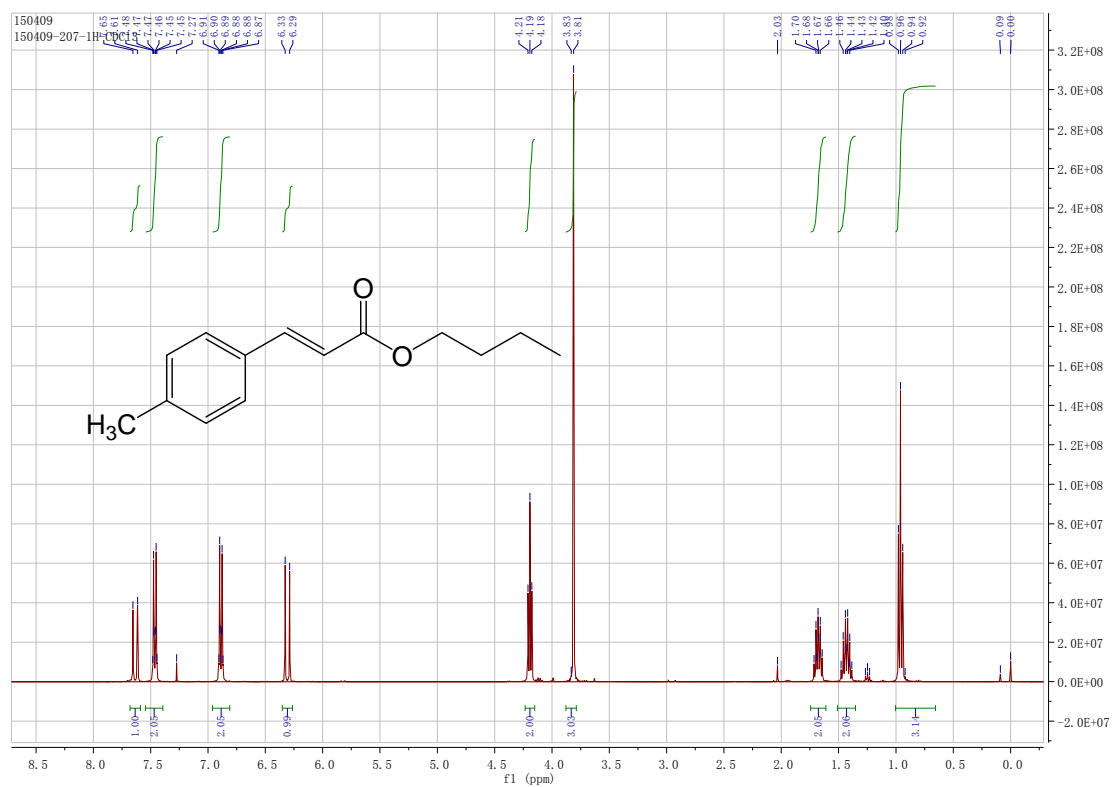
(*E*)-butyl 3-(4-nitrophenyl)acrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.62 (d, $J = 16.0$ Hz, 1H), 7.49 – 7.41 (m, 2H), 7.35 (dd, $J = 8.7, 2.0$ Hz, 2H), 6.41 (d, $J = 16.0$ Hz, 1H), 4.21 (t, $J = 6.7$ Hz, 2H), 1.69 (dt, $J = 14.6, 6.8$ Hz, 2H), 1.51 – 1.36 (m, 2H), 0.96 (t, $J = 7.4$ Hz, 3H).



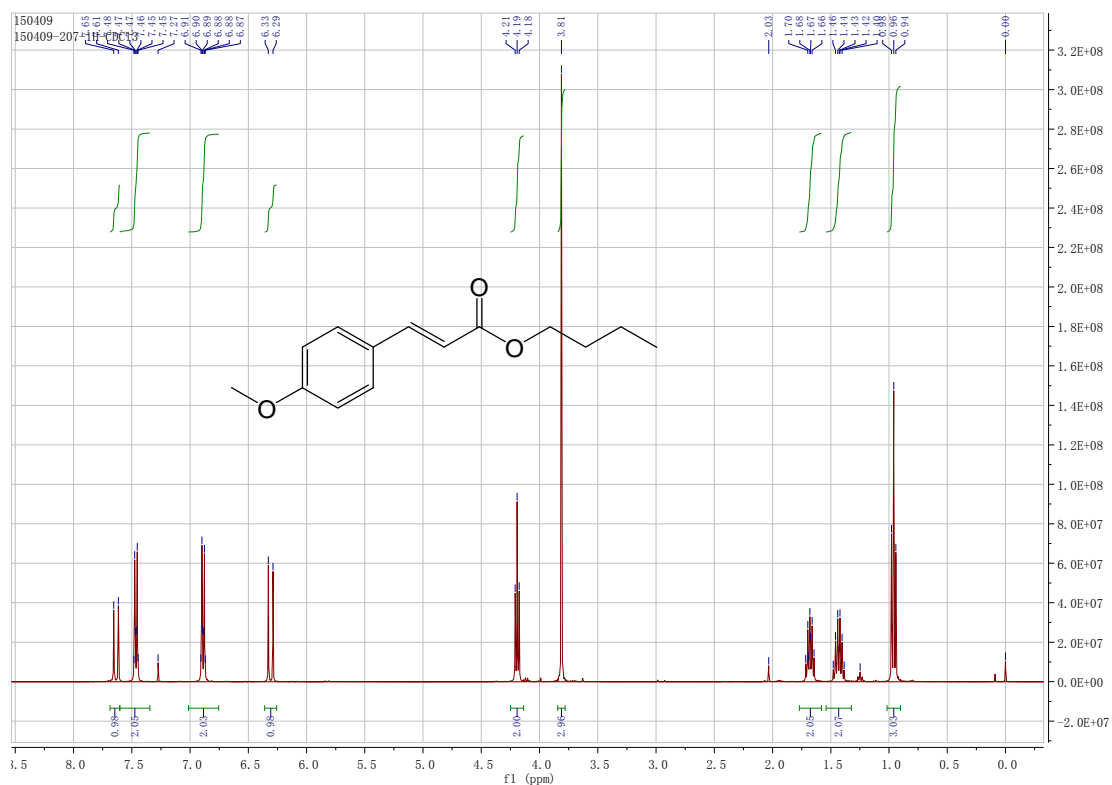
(*E*)-*n*-butyl 3-m-tolylacrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.65 (d, $J = 16.0$ Hz, 1H), 7.37 – 7.21 (m, 3H), 7.19 (d, $J = 7.4$ Hz, 1H), 6.43 (d, $J = 16.0$ Hz, 1H), 4.20 (t, $J = 6.7$ Hz, 2H), 2.36 (d, $J = 5.2$ Hz, 3H), 1.78 – 1.59 (m, 2H), 1.44 (dd, $J = 15.0, 7.5$ Hz, 2H), 0.95 (dd, $J = 20.8, 13.5$ Hz, 3H).



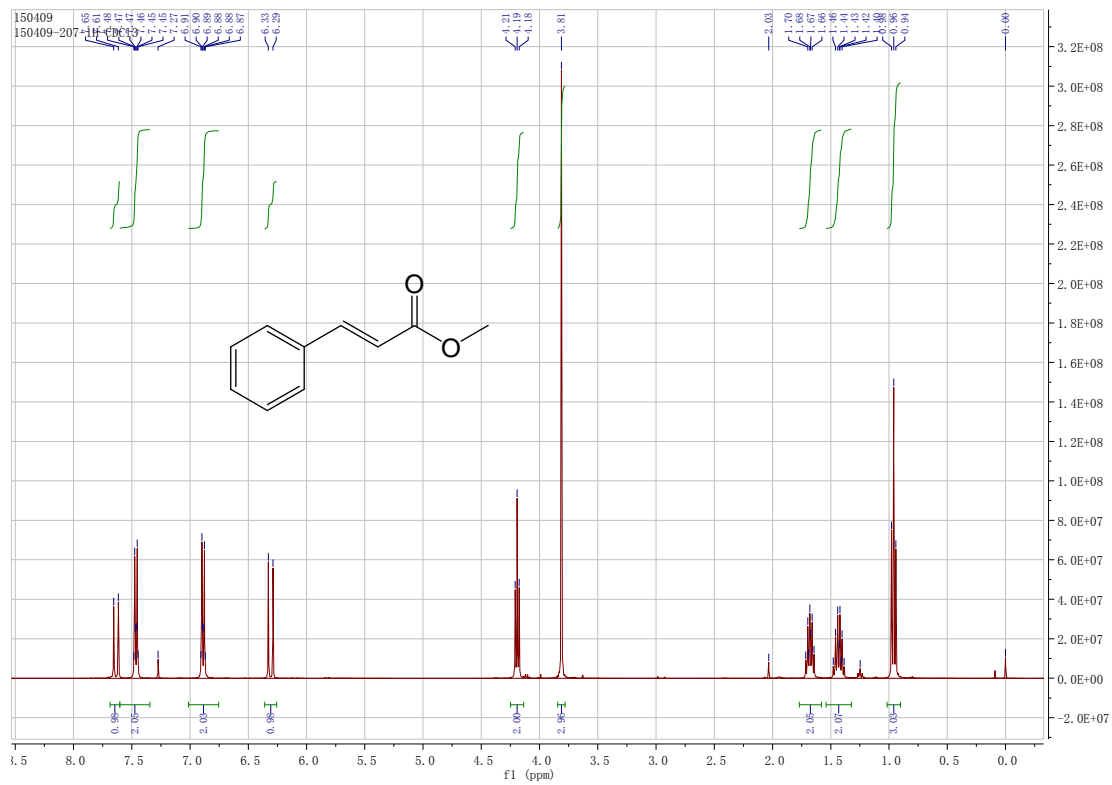
(*E*)-*n*-butyl 3-*p*-tolylacrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.65 (d, $J = 16.0$ Hz, 8H), 7.41 (d, $J = 8.1$ Hz, 16H), 7.25 (s, 1H), 7.18 (d, $J = 8.0$ Hz, 16H), 6.39 (d, $J = 16.0$ Hz, 8H), 4.20 (t, $J = 6.7$ Hz, 16H), 2.36 (s, 24H), 1.74 – 1.62 (m, 16H), 1.51 – 1.36 (m, 16H), 0.96 (t, $J = 7.4$ Hz, 24H), 0.00 (s, 1H).



(*E*)-butyl 3-(4-methoxyphenyl)acrylate: ^1H NMR (400 MHz, CDCl_3) δ 7.63 (d, $J = 16.0$ Hz, 1H), 7.60 – 7.35 (m, 2H), 7.01 – 6.75 (m, 2H), 6.31 (d, $J = 16.0$ Hz, 1H), 4.19 (t, $J = 6.7$ Hz, 2H), 3.81 (s, 3H), 1.77 – 1.58 (m, 2H), 1.54 – 1.32 (m, 2H), 0.96 (t, $J = 7.4$ Hz, 3H).



(*E*)-methyl cinnamate: ^1H NMR (400 MHz, CDCl_3) δ 7.70 (d, $J = 16.0$ Hz, 1H), 7.53 (dd, $J = 6.5, 2.9$ Hz, 2H), 7.46 – 7.29 (m, 3H), 6.45 (d, $J = 16.0$ Hz, 1H), 3.81 (s, 3H).



(*E*)-1,2-diphenylethene: ^1H NMR (400 MHz, CDCl_3) δ 7.53 (d, $J = 7.5$ Hz, 4H), 7.37 (t, $J = 7.6$ Hz, 4H), 7.26 (d, $J = 3.7$ Hz, 2H), 7.12 (s, 2H).

