Supporting Information

Ag$_2$O-promoted ring-opening reactions of cyclopropenones with oximes

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Table of contents

1. General information.....................................................S2
2. General experimental procedures.................................S2
3. Unsuccessful further transformations of the product 3aa.................................................................S3
4. Crystal data and structure refinement of products.................................................................S4
5. Characterization of products in details.............................................................S6
6. $^1$H and $^{13}$C of products......................................................S18
General information

All reagents and solvents were purchased from energy company, Innochem Company and used without further purification. Unless otherwise stated, all experiments were conducted in a Schlenk tube under N₂ atmosphere. Reactions were monitored by TLC or GC-MS analysis. Flash column chromatography was performed over silica gel (300-400 mesh). ¹H NMR (400 MHz) or ¹H NMR (500 MHz) and ¹³C NMR (125 MHz) spectra were recorded in CDCl₃ or DMSO solutions using a Burker AVANCE 500 and 400 spectrometer. Chemical shifts were reported in ppm. ¹H NMR spectra were referenced to CDCl₃ (7.26 ppm) or DMSO-d₆ (2.50 ppm), and ¹³C-NMR spectra were referenced to CDCl₃ (77.0 ppm) or DMSO-d₆ (39.5 ppm). High-resolution mass spectra were recorded on an ESI-Q-TOF mass spectrometer.

Unless otherwise noted, all reagents and solvents were obtained commercially and used without further purification. The 4-oxaspiro[2.4]hepta-1,6-dien-5-ones (2a') were prepared according to corresponding literature procedures.

Reference:

General experimental procedures

A 10 mL Schlenk tube equipped with a stir bar was charged with aryl oxime (0.15 mmol), 2,3-diphenylcycloprop-2-enone (0.45 mmol), Ag₂O (0.15 mmol), and 3 mL cyclohexane. The tube was fitted with a rubber septum, then the septum was replaced by a Teflon screwcap. The reaction mixture was stirred at 80 °C for 18 h. After cooling down, the reaction mixture was diluted with 2 mL of ethyl ether, filtered through a pad of silica gel, followed by washing the pad of the silica gel with the same solvent (20 mL), concentrated under reduced pressure. The residue was then purified by flash chromatography on silica gel to provide the corresponding product.
Unsuccessful further transformations of the product 3aa

Unfortunately, most of the efforts made in further transformations of the products failed.
Crystal data and structure refinement of products

Table 1. Crystal data and structure refinement for 1917041.

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</table>
The HRMS shows an m/z peak of 549.2273, which is in good agreement with that of $d_1$-3aa
Characterization of Products in Details:

\((E)-3-(2,3\text{-diphenylacryloyl})-2\text{-methyl-2,5,6-triphenyl-2,3-dihydro-4H-1,3-oxazin-4-one}\)

\[
\begin{array}{c}
\text{Ph} \\
\text{H}
\end{array}
\]

A pale yellow solid; (69 mg, 84% yield); m. p. 97.4-97.5 °C; \(^1\)H NMR (500 MHz, DMSO): \(\delta\) 7.68 (s, 1H), 7.65-7.63 (m, 2H), 7.48-7.45 (m, 2H), 7.42-7.33 (m, 7H), 7.29-7.18 (m, 9H), 7.10-7.03 (m, 3H), 6.44-6.43 (m, 2H), 2.24 (s, 3H). \(^13\)C NMR (125 MHz, DMSO): \(\delta\) 173.9, 163.7, 161.8, 141.2, 138.3, 138.2, 135.5, 134.5, 132.4, 131.9, 130.9, 130.3, 130.2, 129.8, 129.2, 128.9, 128.5, 128.3, 128.2, 128.1, 127.9, 127.7, 127.1, 125.4, 112.4, 94.9, 27.9 ppm. HRMS (ESI) Calcd. for C\(_{38}\)H\(_{30}\)NO\(_3\): [M+H]\(^+\), 548.2220. Found: m/z 548.2228.

\[
\begin{array}{c}
\text{Ph} \\
\text{H}
\end{array}
\]

A pale yellow solid; (64 mg, 78% yield); m. p. 98.4-98.6 °C; \(^1\)H NMR (500 MHz, DMSO): \(\delta\) 7.68 (s, 0.1H), 7.64-7.63 (m, 2H), 7.48-7.45 (m, 2H), 7.42-7.35 (m, 7H), 7.30-7.23 (m, 5H), 7.21-7.18 (m, 4H), 7.10-7.02 (m, 3H), 6.43-6.42 (m, 2H), 2.24 (s, 3H). \(^13\)C NMR (125 MHz, DMSO): \(\delta\) 173.9, 163.7, 161.8, 141.2, 138.1, 135.4, 134.4, 132.4, 131.9, 130.9, 130.3, 130.2, 129.7, 129.3, 128.9, 128.5, 128.3, 128.2, 128.1, 128.0, 127.7, 127.2, 125.4, 112.4, 94.9, 27.8 ppm. HRMS (ESI) Calcd. for C\(_{38}\)H\(_{30}\)NO\(_3\): [M+H]\(^+\), 549.2283. Found: m/z 549.2283.

\[
\begin{array}{c}
\text{Ph} \\
\text{H}
\end{array}
\]

White solid; (37.5 mg, 55% yield); \(^1\)H NMR (500 MHz, CDCl\(_3\)): \(\delta\) 8.03 (s, 1H), 7.70-7.64 (m, 2H), 7.41-7.32 (m, 3H), 7.28-7.20 (m, 3H), 7.17-7.08 (m, 5H), 7.00-6.92 (m, 2H), 7.10-7.02 (m, 3H), 2.00 (s, 3H) ppm. \(^13\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 165.6, 159.6, 142.8, 133.2, 131.3, 129.8, 129.7, 128.6, 128.3, 127.8, 127.7, 127.0, 112.9, 89.6, 29.3 ppm. HRMS (ESI) Calcd. for C\(_{23}\)H\(_{20}\)NO\(_2\): [M+H]\(^+\), 342.1489. Found: m/z 342.1487.

\((E)-3-(2,3\text{-diphenylacryloyl})-2\text{-methyl-5,6-diphenyl-2-(p-tolyl)-2,3-dihydro-4H-1,3-oxazin-4-one}\)
A pale yellow solid; (62.3 mg, 74% yield); m. p. 80.1-80.2 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.65 (s, 1H), 7.53 (d, \(J = 8.4\) Hz, 2H), 7.45-7.43 (m, 2H), 7.34-7.33 (m, 2H), 7.23-7.14 (m, 12H), 7.08-7.01 (m, 4H), 6.61-6.59 (m, 2H), 2.34 (s, 3H), 2.29 (s, 3H) ppm. \(^1\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 174.7, 164.3, 161.7, 139.0, 138.6, 138.5, 135.9, 135.2, 132.7, 132.6, 131.3, 130.7, 130.5, 130.4, 129.9, 129.2, 128.9, 128.3, 128.2, 128.1, 127.9, 127.8, 127.2, 125.7, 113.3, 95.4, 28.6, 21.1 ppm. HRMS (ESI) Calcd. for C\(_{39}\)H\(_{32}\)NO\(_3\): [M+H]\(^+\), 562.2377. Found: m/z 562.2377.

\((E)-3-(2,3\text{-diphenylacryloyl})-2-(4\text{-methoxyphenyl})-2\text{-methyl}-5,6\text{-diphenyl}-2,3\text{-dihydro-4H-1,3-oxazin-4-one}\)

![Diagram](image)

Yellow liquid; (69.7 mg, 80% yield); \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.60 (s, 1H), 7.53-7.51 (m, 2H), 7.40-7.38 (m, 2H), 7.29-7.26 (m, 3H), 7.19 (s, 1H), 7.17-7.11 (m, 9H), 7.03-6.97 (m, 3H), 6.87-6.83 (m, 2H), 6.59-6.66 (m, 2H), 3.73 (s, 3H), 2.24 (s, 3H) ppm. \(^1\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 174.8, 164.4, 161.6, 159.9, 139.0, 138.7, 135.9, 135.1, 133.4, 132.7, 132.7, 131.4, 130.7, 130.5, 130.5, 129.9, 128.9, 128.3, 128.2, 127.9, 127.8, 127.2, 127.2, 113.9, 113.3, 95.4, 55.3, 28.6 ppm. HRMS (ESI) Calcd. for C\(_{39}\)H\(_{32}\)NO\(_4\): [M+H]\(^+\), 578.2326. Found: m/z 578.2326.

\((E)-3-(2,3\text{-diphenylacryloyl})-2-(4\text{-fluorophenyl})-2\text{-methyl}-5,6\text{-diphenyl}-2,3\text{-dihydro-4H-1,3-oxazin-4-one}\)

![Diagram](image)

Red solid; (60.2 mg, 71% yield); m.p. 147.1-148.6 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.68-7.64 (m, 3H), 7.46-7.43 (m, 2H), 7.36-7.34 (m, 3H), 7.24-7.20 (m, 7H), 7.18-7.15 (m, 3H), 7.11-7.06 ppm.
(m, 5H), 6.63-6.61 (m, 2H), 2.30 (s, 3H) ppm. $^{13}$C NMR (125 MHz, CDCl$_3$): δ 174.8, 162.9 (d, $J$ = 246.3Hz), 162.8 (d, $J$ = 321.3Hz), 139.0, 138.8, 137.4, 137.4, 135.8, 135.0, 132.4, 132.4, 131.3, 130.7, 130.6, 129.8, 129.0, 128.3, 128.2, 128.0, 128.0, 127.9, 127.7 (d, $J$ = 8.8Hz), 127.4, 115.5 (d, $J$ = 21.3Hz), 113.4, 94.9, 28.6 ppm. HRMS (ESI) Calcd. for C$_{38}$H$_{29}$FNO$_3$: [M+H]$^+$, 566.2126. Found: m/z 566.2128.

(E)-2-(4-chlorophenyl)-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

Yellow liquid; (66.7 mg, 76% yield); $^1$H NMR (400 MHz, CDCl$_3$): δ 7.71 (s, 1H), 7.65-7.63 (m, 2H), 7.48-7.45 (m, 2H), 7.30 (m, 5H), 7.20-7.18 (m, 9H), 7.15-7.08 (m, 3H), 6.65 (d, $J$ = 6.8Hz, 2H), 2.32 (s, 3H) ppm. $^{13}$C NMR (125 MHz, CDCl$_3$): δ 174.7, 164.0, 161.6, 140.8, 139.2, 138.7, 135.8, 135.0, 134.8, 132.4, 132.3, 131.2, 130.7, 130.6, 130.6, 130.0, 129.0, 128.8, 128.3, 128.2, 128.0, 127.9, 127.4, 127.2, 113.4, 94.8, 28.5 ppm. HRMS (ESI) Calcd. for C$_{38}$H$_{28}$BrNO$_3$: [M+Na]$^+$, 648.1151. Found: m/z 648.1152.

(E)-2-(4-bromophenyl)-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

White solid; (48.5 mg, 52% yield); m.p. 132.8-133.8 °C; $^1$H NMR (400 MHz, CDCl$_3$): δ 7.67 (s, 1H), 7.54 (d, $J$ = 2.4Hz, 4H), 7.44-7.42 (m, 2H), 7.35-7.29 (m, 4H), 7.21-7.19 (m, 6H), 7.18-7.14 (m, 3H), 7.11-7.07 (m, 3H), 6.62-6.60 (m, 2H), 2.28 (s, 3H) ppm. $^{13}$C NMR (125 MHz, CDCl$_3$): δ 174.7, 164.0, 161.6, 140.8, 139.2, 138.7, 135.8, 135.0, 132.3, 132.3, 131.8, 131.3, 130.7, 130.7, 130.6, 129.8, 129.0, 128.3, 128.2, 128.0, 128.0, 127.9, 127.5, 127.4, 123.0, 113.4, 94.8, 28.4 ppm. HRMS (ESI) Calcd. for C$_{38}$H$_{28}$BrNO$_3$: [M+Na]$^+$, 648.1151. Found: m/z 648.1152.

(E)-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2-(4-(trifluoromethyl)phenyl)-2,3-dihydro-4H-1,3-oxazin-4-one
A pale red solid; (65.0 mg, 70% yield); m.p. 156.9-157.5 °C; 1H NMR (400 MHz, CDCl₃): δ 7.81 (d, J = 8.0 Hz, 2H), 7.69-7.66 (m, 4H), 7.45-7.42 (m, 2H), 7.36-7.34 (m, 3H), 7.22-7.20 (m, 6H), 7.18-7.15 (m, 3H), 7.10-7.05 (m, 3H), 6.59-6.57 (m, 2H), 2.30 (s, 3H) ppm. 13C NMR (125 MHz, CDCl₃): δ 174.7, 163.9, 161.7, 145.7, 139.4, 138.5, 135.7, 134.9, 132.2, 131.2, 131.0, 130.8, 130.7, 130.6, 129.8, 128.6 (q, J = 288.8 Hz), 129.1, 128.4, 128.3, 128.2, 128.2 (q, J = 38.8 Hz), 128.0, 127.9, 126.2, 125.7 (q, J = 38.8 Hz), 125.5, 113.5, 94.6, 28.4 ppm. HRMS (ESI) Calcd. for C₉₀H₂₉F₃NO₃: [M+H]+, 616.2094. Found: m/z 616.2105.

(E)-3-(2,3-diphenylacryloyl)-2-(3-fluorophenyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazine

A pale yellow solid; (30.6 mg, 36% yield); m.p. 174.7-175.7 °C; 1H NMR (400 MHz, CDCl₃): δ 7.61 (s, 1H), 7.40-7.36 (m, 3H), 7.34-7.30 (m, 2H), 7.29-7.27 (m, 3H), 7.26-7.23 (m, 1H), 7.20 (s, 1H), 7.15-7.13 (m, 5H), 7.12-7.11 (m, 2H), 7.03-6.97 (m, 4H), 6.56-6.54 (m, 2H), 2.23 (s, 3H). 13C NMR (125 MHz, CDCl₃): δ 174.6, 162.9 (d, J = 245.0 Hz), 162.8 (d, J = 281.3 Hz), 144.4, 144.4, 139.2, 138.7, 135.8, 135.0, 132.4, 132.3, 131.2, 130.7, 130.6, 130.5, 130.2 (d, J = 7.5 Hz), 129.8, 129.0, 128.3, 128.2, 128.0, 127.9, 127.9, 127.4, 121.6 (d, J = 2.5 Hz), 116.0 (d, J = 21.3 Hz), 113.4, 113.0 (d, J = 22.5 Hz), 94.6, 28.4 ppm. HRMS (ESI) Calcd. for C₉₀H₂₉F₃NO₃Na: [M+Na]+, 588.1951. Found: m/z 588.1945.

(E)-2-(3-chlorophenyl)-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazine

A pale red solid; (51.0 mg, 61% yield); m.p. 175.3-175.4 °C; 1H NMR (400 MHz, CDCl₃): δ 7.62
(s,2H), 7.50-7.47 (m, 1H), 7.38-7.35 (m, 2H), 7.30-7.23 (m, 6H), 7.21 (s, 1H), 7.17-7.14 (m, 6H), 7.12-7.11 (m, 2H), 7.05-6.98 (m, 3H), 6.57-6.55 (m, 2H), 2.23 (s, 3H) ppm. 13C NMR (125 MHz, CDCl$_3$): δ 174.6, 163.8, 161.7, 143.8, 139.2, 138.6, 135.8, 135.0, 134.7, 132.3, 131.3, 130.7, 130.7, 130.6, 129.9, 129.8, 129.2, 129.0, 128.3, 128.2, 128.1, 128.0, 127.9, 127.4, 125.9, 124.2, 113.4, 94.5, 28.4 ppm. HRMS (ESI) Calcd. for C$_{38}$H$_{29}$ClNO$_3$: [M+H]$^+$, 582.1831. Found: m/z 582.1830.

(E)-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2-(m-tolyl)-2,3-dihydro-4H-1,3-oxazin-4-one

A pale yellow solid; (54.0 mg, 64% yield); m.p. 151.6-152.6 °C; 1H NMR (500 MHz, CDCl$_3$): δ 7.61 (s, 1H), 7.40-7.38 (m, 4H), 7.31-7.26 (m, 3H), 7.17-7.09 (m, 11H), 7.04-6.97 (m, 4H), 6.54 (d, J = 7.5Hz, 2H), 2.30 (s, 3H), 2.24 (s, 3H) ppm. 13C NMR (125 MHz, CDCl$_3$): δ 174.7, 164.2, 161.8, 141.5, 138.9, 138.7, 138.3, 135.9, 135.2, 132.6, 131.3, 130.8, 130.5, 130.4, 129.9, 129.6, 128.9, 128.4, 128.2, 128.1, 127.9, 127.8, 127.2, 126.5, 122.7, 113.4, 95.4, 28.6, 21.6 ppm. HRMS (ESI) Calcd. for C$_{39}$H$_{32}$NO$_3$: [M+H]$^+$, 562.2377. Found: m/z 562.2377.

(E)-3-(2,3-diphenylacryloyl)-2-(3-methoxyphenyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

Yellow solid; (64.0 mg, 74% yield); m.p. 149.3-150.9 °C; 1H NMR (400 MHz, CDCl$_3$): δ 7.68 (s, 1H), 7.45-7.43 (m, 2H), 7.35-7.31 (m, 3H), 7.30-7.27 (m, 2H), 7.25-7.22 (m, 6H), 7.20-7.14 (m, 5H), 7.09-7.06 (m, 2H), 7.04 (s, 1H), 6.90-6.87 (m, 1H), 6.62-6.60 (m, 2H), 3.79 (s, 3H), 2.30 (s, 3H) ppm. 13C NMR (125 MHz, CDCl$_3$): δ 174.6, 164.2, 161.8, 159.8, 143.3, 138.9, 138.8, 135.9, 135.1, 132.6, 132.6, 131.3, 130.8, 130.5, 129.9, 129.6, 128.9, 128.3, 128.2, 128.1, 128.0, 127.9, 127.8, 127.2, 118.2, 114.4, 113.4, 111.6, 95.2, 55.3, 28.6 ppm. HRMS (ESI) Calcd. for C$_{39}$H$_{32}$NO$_4$: [M+H]$^+$, 578.2326. Found: m/z 578.2326.

(E)-3-(2,3-diphenylacryloyl)-2-(2-fluorophenyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one
A pale yellow solid; (53.0 mg, 63% yield); m.p. 160.6-161.3 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.71 (s, 1H), 7.51-7.46 (m, 3H), 7.39-7.34 (m, 4H), 7.28-7.23 (m, 5H), 7.21-7.17 (m, 6H), 7.13-7.05 (m, 4H), 6.68-6.66 (m, 2H), 2.45 (s, 3H) ppm. \(^1^3\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 174.8, 163.3 (d, \(J = 257.5\)Hz), 159.8 (d, \(J = 247.5\)Hz), 139.0, 138.9, 135.8, 135.0, 132.5, 131.4, 131.0 (d, \(J = 7.5\)Hz), 130.7, 130.6, 130.5, 130.5, 130.0, 129.0, 128.3, 128.2, 128.0, 127.9, 127.4, 127.3, 127.2, 124.2 (d, \(J = 3.8\)Hz), 116.8 (d, \(J = 22.5\)Hz), 112.3, 94.2 (d, \(J = 3.8\)Hz), 25.8 ppm. HRMS (ESI) Calcd. for C\(_{38}\)H\(_{28}\)FNO\(_3\)Na: [M+Na]\(^+\), 588.1951. Found: m/z 588.1945.

\((E)\)-2-(2-chlorophenyl)-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4\(H\)-1,3-oxazin-4-one

A pale yellow solid; (46.7 mg, 54% yield); m.p. 130.7-131.2 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.75 (s, 1H), 7.66 (dd, \(J = 2.0\)Hz, 1H), 7.51-7.48 (m, 3H), 7.39-7.38 (m, 5H), 7.33-7.29 (m, 4H), 7.24-7.21 (m, 6H), 7.15-7.11 (m, 3H), 6.74-6.72 (m, 2H), 2.59 (s, 3H) ppm. \(^1^3\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 174.8, 164.4, 162.4, 139.0, 138.9, 136.8, 135.8, 135.0, 132.6, 132.5, 132.3, 131.3, 131.1, 130.7, 130.6, 130.5, 130.3, 129.0, 128.3, 128.2, 128.0, 127.9, 127.9, 127.8, 127.3, 126.9, 112.5, 95.3, 24.9 ppm. HRMS (ESI) Calcd. for C\(_{38}\)H\(_{29}\)ClNO\(_3\): [M+H]\(^+\), 582.1831. Found: m/z 582.1830.

\((E)\)-3-(2,3-diphenylacryloyl)-2-ethyl-2-(4-methoxyphenyl)-5,6-diphenyl-2,3-dihydro-4\(H\)-1,3-oxazin-4-one

Red liquid; (73.2 mg, 83% yield); \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.68-7.65 (m, 1H), 7.58-7.55 (m, 2H), 7.50-7.47 (m, 2H), 7.36-7.31 (m, 6H), 7.25-7.19 (m, 5H), 7.15-7.12 (m, 2H), 7.10-7.03 (m, 3H),
6.88(d, J = 8.8Hz, 2H), 6.68 (d, J = 7.2Hz, 2H), 3.79 (s, 3H), 2.79 (q, J = 7.2Hz,1H), 2.55 (q, J =
7.2 Hz, 1H), 1.27 (t, J = 6.8Hz, 3H) ppm. 13C NMR (125 MHz, CDCl3): δ 174.8, 165.3, 161.7, 
159.7, 138.8, 138.2, 136.1, 135.1, 132.9, 132.8, 132.7, 131.4, 130.6, 130.5, 130.5, 129.9, 128.8,
128.3, 128.1, 128.0, 127.9, 127.9, 127.5, 127.3, 113.7, 113.4, 98.1, 55.3, 33.4, 8.8 ppm. HRMS 
(ESI) Calcd. for C40H34NO4: [M+H]+, 592.2483. Found: m/z 592.2482.

(E)-3-(2,3-diphenylacryloyl)-2,5,6-triphenyl-2-propyl-2,3-dihydro-4H-1,3-oxazin-4-one

A pale red solid; (67.5 mg, 78% yield); m.p. 73.0-74.0 °C; 1H NMR (400 MHz, CDCl3): δ 
7.68-7.67 (m, 3H), 7.52-7.49 (m, 2H), 7.38-7.33 (m, 9H), 7.24-7.20 (m, 4H), 7.19-7.15 (m,3H), 
7.11-7.04 (m, 3H), 6.64 (d, J = 7.2Hz, 2H), 2.81-2.73 (m, 1H), 2.54-2.46 (m, 1H), 1.89-1.70 (m, 
2H), 1.03 (t, J = 7.6Hz, 3H) ppm. 13C NMR (125 MHz, CDCl3): δ 174.0, 164.6, 160.7, 139.2, 138.9, 138.7, 135.7, 135.0, 132.7, 132.6, 131.3, 130.8, 130.5, 130.0, 129.5, 129.4, 129.3, 129.2, 129.1, 129.0, 128.9, 128.6, 128.4, 128.2, 128.1, 127.9, 127.9, 127.3, 126.1, 113.5, 97.8, 42.4, 17.5, 14.2 ppm. HRMS (ESI) Calcd. for C40H34NO3: [M+H]+, 576.2533. Found: m/z 576.2533.

(E)-3-(2,3-diphenylacryloyl)-2,2,5,6-tetraphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

Yellow liquid; (46.3 mg, 51% yield); 1H NMR (500 MHz, CDCl3): δ 7.55-7.51 (m, 5H), 7.34-7.33 
(m, 7H), 7.21-7.17 (m, 4H), 7.16 (s, 1H), 7.13-7.00 (m, 12H), 6.64 (d, J = 6.5Hz, 2H) ppm. 13C 
NMR (125 MHz, CDCl3): δ 174.0, 164.6, 160.7, 139.2, 138.9, 138.7, 135.7, 135.0, 132.7, 132.6, 
131.3, 130.8, 130.5, 130.0, 129.5, 129.4, 129.3, 129.2, 129.1, 129.0, 128.9, 128.6, 128.4, 128.2, 
128.1, 128.0, 127.9, 127.4, 113.4, 98.5 ppm. HRMS (ESI) Calcd. for C43H32NO3: [M+H]+, 610.2377. Found: m/z 610.2377.

(E)-3-(2,3-diphenylacryloyl)-2-(furan-2-yl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

(E)-3-(2,3-diphenylacryloyl)-2-(furan-2-yl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one
A pale red solid; (32.3 mg, 40% yield); m.p. 110.3-111.4 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.64 (s, 1H), 7.49 (s, 1H), 7.46-7.43 (m, 2H), 7.39-7.34 (m, 3H), 7.24-7.12 (m, 13H), 6.77-6.75 (m, 2H), 6.55 (d, \(J\) = 3.2Hz, 1H), 6.39-3.38 (m, 1H), 2.37 (s, 3H) ppm. \(^1\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 174.1, 164.0, 161.2, 151.6, 143.1, 138.8, 138.7, 135.8, 135.1, 132.5, 131.5, 130.7, 130.6, 130.5, 130.1, 129.0, 128.3, 128.2, 127.9, 127.9, 127.3, 112.6, 111.0, 110.7, 90.3, 24.7 ppm. HRMS (ESI) Calcd. for C\(_{36}\)H\(_{27}\)NO\(_4\)Na: [M+Na]\(^+\), 560.1838. Found: m/z 560.1832.

\((E)-3-(2,3\text{-diphenylacryloyl})-2\text{-methyl-5,6-diphenyl-2-(thiophen-2-yl)-2,3-dihydro-4H-1,3-oxazin-4-one}\)

A pale red solid; (69.7 mg, 84% yield); m.p. 112.3-113.8 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.67 (s, 1H), 7.46-7.43 (m, 2H), 7.39-7.35 (m, 3H), 7.32-7.31 (m, 1H), 7.30-7.27 (m, 3H), 7.26-7.24 (m, 2H), 7.22-7.17 (m, 6H), 7.13-7.07 (m, 3H), 6.95-6.93 (m, 1H), 6.74-6.71 (m, 2H), 2.42 (s, 3H) ppm. \(^1\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 174.3, 164.1, 161.2, 151.6, 143.1, 138.8, 138.7, 135.9, 135.1, 132.5, 131.4, 130.7, 130.6, 130.5, 130.3, 129.0, 128.3, 128.2, 128.1, 128.0, 127.9, 127.3, 126.7, 125.7, 112.9, 93.2, 29.2 ppm. HRMS (ESI) Calcd. for C\(_{36}\)H\(_{28}\)NO\(_3\)S: [M+H]\(^+\), 554.1784. Found: m/z 554.1784.

\((E)-2,2\text{-dibenzyl-3-(2,3\text{-diphenylacryloyl})-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one}\)

White solid; (77.8 mg, 81% yield); m.p. 151.5-152.3 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): \(\delta\) 7.38-7.34 (m, 5H), 732-7.28 (m, 8H), 7.24-7.19 (m, 8H), 7.13-7.05 (m, 5H), 6.99-6.97 (m, 2H), 6.80 (d, \(J\) = 7.2Hz, 2H), 6.43 (s, 1H), 4.02 (d, \(J\) = 14.4Hz, 2H), 3.55 (d, \(J\) = 14.4Hz, 2H) ppm. \(^1\)C NMR (125 MHz, CDCl\(_3\)): \(\delta\) 175.8, 164.8, 160.2, 138.8, 137.1, 136.2, 135.2, 135.1, 132.8, 132.2, 131.6, 131.6, 130.7, 130.4, 130.3, 130.2, 128.4, 128.2, 128.2, 127.9, 127.8, 127.7, 127.6, 127.3, 111.1, 97.3, 42.4 ppm. HRMS (ESI) Calcd. for C\(_{45}\)H\(_{36}\)NO\(_3\): [M+H]\(^+\), 638.2690. Found: m/z 638.2690.
(E)-3-(2,3-diphenylacryloyl)-2,2-diethyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

Red solid; (70.2 mg, 91% yield); m.p. 122.5-123.4°C; ¹H NMR (400 MHz, CDCl₃): δ 7.50 (s, 1H), 7.45-7.43 (m, 2H), 7.36-7.32 (m, 4H), 7.30-7.27 (m, 2H), 7.23-7.16 (m, 8H), 7.12-7.10 (m, 2H), 7.04-7.01 (m, 2H), 2.62-2.53 (m, 2H), 2.44-2.34 (m, 2H), 1.19 (t, J = 7.6Hz, 6H) ppm. ¹³C NMR (125 MHz, CDCl₃): δ 174.6, 165.1, 161.6, 139.0, 137.1, 136.1, 135.2, 133.0, 132.9, 131.7, 130.5, 130.4, 128.7, 128.3, 128.1, 127.9, 127.9, 127.3, 111.0, 98.5, 28.2, 8.4 ppm. HRMS (ESI) Calcd. for C₃₅H₃₂NO₃: [M+H]+, 514.2377. Found: m/z 514.2377.

(E)-2-cyclohexyl-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

White solid; (48.8 mg, 59% yield); m.p. 152.6-153.6°C; ¹H NMR (400 MHz, CDCl₃): δ 7.51 (s, 1H), 7.41-7.39 (m, 2H), 7.33-7.29 (m, 4H), 7.22-7.15 (m, 1H), 7.13-7.10 (m, 2H), 6.94-6.92 (m, 2H), 2.68-2.60 (m, 1H), 1.99 (s, 3H), 1.90-1.87 (m, 2H), 1.73-1.71 (m, 1H), 1.61 (s, 1H), 1.45 (q, J = 12.0Hz, 2H), 1.23-1.21 (m, 2H) ppm. ¹³C NMR (125 MHz, CDCl₃): δ 174.4, 164.3, 161.5, 139.1, 137.7, 136.0, 135.3, 132.9, 131.6, 130.6, 130.4, 130.3, 128.7, 128.2, 128.1, 128.0, 127.8, 127.2, 111.2, 111.1, 98.1, 43.1, 28.0, 27.6, 26.5, 26.4, 26.3, 21.3 ppm. HRMS (ESI) Calcd. for C₃₈H₃₆NO₃: [M+H]+, 554.2690. Found: m/z 554.2690.

(E)-2-butyl-3-(2,3-diphenylacryloyl)-2-methyl-5,6-diphenyl-2,3-dihydro-4H-1,3-oxazin-4-one

White oil; (44.3 mg, 56% yield); ¹H NMR (500 MHz, CDCl₃): δ 7.52 (s, 1H), 7.42-7.38 (m, 2H), 7.33-7.28 (m, 3H), 7.28-7.24 (m, 1H), 7.21-7.08 (m, 12H), 7.00-6.96 (m, 2H), 2.56-2.46 (m, 1H), 2.33-2.23 (m, 1H), 2.02 (s, 3H), 1.74-1.52 (m, 2H), 1.44-1.35 (m, 2H), 0.95 (q, J = 6.0 Hz, 3H) ppm. ¹³C NMR (125 MHz, CDCl₃): δ 174.8, 164.1, 161.2, 139.1, 137.5, 135.9, 135.0, 132.8, 132.7, 131.5, 130.4, 130.3, 129.8, 128.7, 128.2, 128.0, 127.9, 127.8, 127.2, 111.0, 95.4, 36.8, 26.0, 23.5, 22.7, 13.9 ppm. HRMS (ESI) Calcd. for C₃₆H₃₄NO₃: [M+H]+, 528.2533. Found: m/z
(E)-10-(2,3-diphenylacryloyl)-7,8-diphenyl-6-oxa-10-azaspiro[4.5]dec-7-en-9-one

Red solid; (35.6 mg, 47% yield); m.p. 133.7-134.8 °C; 1H NMR (400 MHz, CDCl3): δ 7.56 (s, 1H), 7.41-7.38 (m, 2H), 7.23-7.13 (m, 12H), 7.04-7.01 (m, 2H), 2.61-2.47 (m, 4H), 2.13-1.97 (m, 4H) ppm. 13C NMR (125 MHz, CDCl3): δ 175.5, 164.4, 161.8, 139.3, 138.1, 135.9, 135.1, 133.0, 132.7, 131.6, 130.5, 130.5, 129.9, 128.9, 128.3, 128.1, 128.0, 127.9, 127.3, 111.6, 103.1, 36.2, 24.0 ppm. HRMS (ESI) Calcd. for C35H30NO3: [M+H]+, 512.2220. Found: m/z 512.2220.

(E)-5-(2,3-diphenylacryloyl)-2,3-diphenyl-1-oxa-5-azaspiro[5.5]undec-2-en-4-one

A pale yellow solid; (48.9 mg, 59% yield); m.p. 137.8-138.3 °C; 1H NMR (400 MHz, CDCl3): δ 7.54 (s, 1H), 7.34-7.33 (m, 2H), 7.30-7.25 (m, 4H), 7.22-7.21 (m, 3H), 7.18-7.11 (m, 7H), 7.07-7.06 (m, 2H), 6.97-6.96 (m, 2H), 2.52-2.38 (m, 4H), 1.82 (s, 4H), 1.56 (s, 1H) 1.43-1.38 (m, 1H) ppm. 13C NMR (125 MHz, CDCl3): δ 175.3, 164.0, 160.6, 139.5, 138.4, 135.9, 135.1, 133.1, 132.9, 131.6, 130.5, 130.4, 130.1, 128.9, 128.2, 128.1, 128.0, 127.8, 127.3, 111.3, 94.2, 32.6, 24.6, 22.6 ppm. HRMS (ESI) Calcd. for C36H31NO3Na: [M+Na]+, 548.2196. Found: m/z 548.2196.

(E)-5-(2,3-diphenylacryloyl)-2,3-diphenyl-1-oxa-5-azaspiro[5.6]dodec-2-en-4-one

Red solid; (34.1 mg, 43% yield); m.p. 171.4-172.1 °C; 1H NMR (400 MHz, CDCl3): δ 7.55 (s, 1H), 7.41-7.39 (m, 2H), 7.37-7.27 (m, 5H), 7.23-7.15 (m, 9H), 7.13-7.11 (m, 2H), 7.02-7.00 (m, 2H), 2.68-2.55 (m, 4H), 1.95-1.85 (m, 4H), 1.80-1.72 (m, 4H) ppm. 13C NMR (125 MHz, CDCl3): δ 175.6, 164.2, 160.6, 139.6, 137.9, 136.0, 135.1, 133.1, 132.8, 131.6, 130.5, 130.4, 129.9, 128.8, 128.3, 128.1, 128.0, 127.9, 127.3, 111.3, 98.5, 37.5, 28.9, 22.6 ppm. HRMS (ESI) Calcd. for C37H33NO3Na: [M+Na]+, 562.2358. Found: m/z 562.2329.
(E)-3-(2,3-bis(4-fluorophenyl)acryloyl)-5,6-bis(4-fluorophenyl)-2-methyl-2-phenyl-2,3-dihydro-4H-1,3-oxazin-4-one

A pale orange solid; (47.5 mg, 51% yield); m.p. 172.2-173.3 °C; $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.60-7.59 (m, 3H), 7.41-7.36 (m, 5H), 7.25-7.21 (m, 2H), 7.15-7.11 (m, 2H), 7.05 (t, $J = 8.8$Hz, 2H), 6.94-6.89 (m, 4H), 6.77 (t, $J = 8.8$Hz, 2H), 6.56-6.53 (m, 2H), 2.29 (s, 3H) ppm.

$^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 174.3, 164.2, 163.9 (d, $J = 252.5$Hz), 163.0 (d, $J = 248.8$Hz), 162.6 (d, $J = 246.3$Hz), 162.1 (d, $J = 246.3$Hz), 161.0, 141.1, 137.9, 137.5, 132.8 (d, $J = 7.5$Hz), 132.5 (d, $J = 8.8$Hz), 132.3 (d, $J = 8.8$Hz), 132.1 (d, $J = 8.8$Hz), 131.6 (d, $J = 3.8$Hz), 130.9 (d, $J = 2.5$Hz), 129.1, 128.7, 128.3 (d, $J = 2.5$Hz), 128.2 (d, $J = 3.8$Hz), 125.6, 115.5 (d, $J = 21.3$Hz), 115.4 (d, $J = 21.3$Hz), 115.2 (d, $J = 21.3$Hz), 112.2, 95.6, 28.4 ppm. HRMS (ESI) Calcd. for C$_{38}$H$_{26}$F$_4$NO$_3$: [M+H]$^+$, 620.1844. Found: m/z 620.1818.

(E)-3-(2,3-bis(4-chlorophenyl)acryloyl)-5,6-bis(4-chlorophenyl)-2-methyl-2-phenyl-2,3-dihydro-4H-1,3-oxazin-4-one

Luminous yellow solid; (63.6 mg, 62% yield); m.p. 112.0-113.0 °C; $^1$H NMR (400 MHz, CDCl$_3$): $\delta$ 7.60-7.56 (m, 3H), 7.39-7.35 (m, 3H), 7.33-7.30 (m, 4H), 7.24-7.19 (m, 4H), 7.16-7.14 (m, 2H), 7.10-7.03 (m, 4H), 6.49 (d, $J = 8.0$Hz, 2H), 2.28 (s, 3H) ppm. $^{13}$C NMR (125 MHz, CDCl$_3$): $\delta$ 137.8, 163.9, 161.2, 140.9, 138.0, 137.3, 135.3, 134.3, 133.9, 133.7, 133.1, 132.4, 132.1, 131.6, 131.2, 130.6, 130.4, 129.2, 129.0, 128.7, 128.7, 128.7, 128.6, 128.4, 125.5, 112.5, 95.7, 28.4 ppm. HRMS (ESI) Calcd. for C$_{38}$H$_{26}$Cl$_4$NO$_3$Na: [M+Na]$^+$, 706.0487. Found: m/z 706.0468.

(E)-3-(2,3-di-p-tolylacryloyl)-2-methyl-2-phenyl-5,6-di-p-tolyl-2,3-dihydro-4H-1,3-oxazin-4-one
Yellow solid; (23.2 mg, 26% yield); m.p. 106.7-107.5 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): δ 7.64-7.62 (m, 2H), 7.59 (s, 1H), 7.38-7.31 (m, 5H), 7.16-7.07 (m, 6H), 7.01 (t, \(J = 7.6\)Hz, 4H), 6.85 (d, \(J = 8.0\)Hz, 2H), 6.50 (d, \(J = 8.0\)Hz, 2H), 2.32 (s, 3H), 2.30 (d, \(J = 2.4\)Hz, 6H), 2.26 (s, 3H), 2.19 (s, 3H) ppm. \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 175.2, 164.5, 161.4, 141.8, 140.8, 139.0, 138.5, 138.0, 137.4, 136.7, 133.2, 132.5, 131.1, 130.6, 129.9, 129.9, 129.9, 129.0, 128.9, 128.7, 128.6, 128.4, 125.7, 112.9, 95.0, 28.6, 21.4, 21.4, 21.3, 21.1 ppm. HRMS (ESI) Calcd. for C\(_{42}\)H\(_{38}\)NO\(_3\): [M+H]\(^+\), 604.2846. Found: m/z 604.2840.

(E)-3-(2,3-bis(3-chlorophenyl)acryloyl)-5,6-bis(3-chlorophenyl)-2-methyl-2-phenyl-2,3-dihydro-4\(H\)-1,3-oxazin-4-one

Yellow solid; (86.2 mg, 84% yield); m.p. 141.9-142.3 °C; \(^1\)H NMR (400 MHz, CDCl\(_3\)): δ 7.60-7.57 (m, 3H), 7.44-7.39 (m, 4H), 7.35-7.33 (m, 2H), 7.32-7.27 (m, 3H), 7.25-7.23 (m, 1H), 7.16-7.09 (m, 4H), 7.01-6.98 (m, 2H), 6.95-6.63 (m, 1H), 6.63 (s, 1H), 6.42 (d, \(J = 8\)Hz, 1H), 2.30 (s, 3H) ppm. \(^{13}\)C NMR (125 MHz, CDCl\(_3\)): δ 173.4, 163.8, 161.0, 140.6, 138.5, 137.8, 130.7, 136.2, 134.4, 134.3, 133.9, 133.7, 133.6, 131.0, 131.0, 130.5, 130.3, 129.7, 129.6, 129.5, 129.4, 129.3, 129.3, 128.9, 128.8, 128.5, 128.4, 128.2, 127.9, 125.6, 96.0, 28.3 ppm. HRMS (ESI) Calcd. for C\(_{38}\)H\(_{25}\)Cl\(_4\)N\(_3\)O\(_4\): [M+Na]\(^+\), 706.0487. Found: m/z 706.0468.
$^1$H and $^{13}$CNMR of products: