Supporting Information

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1. General remarks

$^1$H NMR spectra were recorded on commercial instruments (400 MHz). Chemical shifts were reported in ppm from tetramethylsilane with the solvent resonance as the internal standard (CDCl$_3$, $\delta$ = 7.26). Spectra are reported as follows: chemical shift ($\delta$ ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constants (Hz), integration, and assignment. $^{13}$C NMR spectra were collected on commercial instruments (100 MHz) with complete proton decoupling. Chemical shifts are reported in ppm from the tetramethylsilane with the solvent resonance as internal standard (CDCl$_3$, $\delta$ = 77.0). The enantiomeric excess was determined by HPLC analysis employing a chiral stationary phase column specified in the individual experiment, by comparing the samples with the appropriate racemic mixtures. Optical rotations were measured on a commercial polarimeter and reported as follows: $[\alpha]_D^T$ (c = g/100 mL, solvent). HR-ESIMS spectra were recorded using a commercial apparatus and methanol or acetonitrile was used to dissolve the sample. Unless otherwise indicated, reagents obtained from commercial sources were used without further purification. Solvents were dried and distilled prior to use according to the standard methods. The $N,N'$-dioxides were prepared according to the previous reports. $^1$ All racemic products were obtained by using Mg(OTf)$_2$ (10 mol%) in concert with racemic $N,N'$-dioxide ligand ($L$-$\text{PiPr}_2$, 10 mol%) as the catalyst. Starting materials of alkylidene malonates 1 were prepared according to reported procedure. $^2$

2. Preparation of the compound $\alpha$-isocyanoacetamides 2

The $\alpha$-isocyanoacetamide substrates were synthesized by the procedure in the literature. $^3$

2.1 Method A: Preparation of $\alpha$-isocyanoacetamides 2a, 2b, 2d-2h.

Acetic anhydride (17.0 mL, 180.2 mmol, 7.2 equiv) was added dropwise to a solution of amino acid (25.0 mmol, 1.0 equiv) in HCOOH (50.0 mL) at 0 °C. After the addition was complete, the reaction mixture was stirred at r.t. for an additional 1 h. Ice-water (20.0 mL) was added and the mixture was concentrated at reduced pressure to give the analytically pure white crystalline $N$-formyl amino acid.

To a solution of $N$-formyl amino acid (19.0 mmol, 1.0 equiv) and $\text{HNR}^2\text{R}^3$ (22.9 mmol, 1.2 equiv) in CH$_2$Cl$_2$ (50.0 mL) were added Et$_3$N (3.2 mL, 23.2 mmol, 1.2 equiv), HOBt (3.11 g, 23.0 mmol, 1.2 equiv) and EDCI (4.41 g, 23.0 mmol, 1.2 equiv) successively and the reaction mixture was stirred for 24 h at r.t. The reaction mixture was diluted with sat. NH$_4$Cl and extracted with CH$_2$Cl$_2$. The organic layer was washed with brine, dried over anhyd Na$_2$SO$_4$ and concentrated. The residue was purified by flash column chromatography on silica gel (eluent: petroleum ether–EtOAc, 1:1 then EtOAc) to give the amide.
A stirred solution of amide (18.5 mmol, 1.0 equiv) and Et₃N (12.8 mL, 92.0 mmol, 5.0 equiv) in CH₂Cl₂ (90.0 mL) was cooled to –30 °C. Phosphorus oxychloride (2.6 mL, 27.5 mmol, 1.5 equiv) was added dropwise and the reaction mixture was stirred for 3 h at –30 °C. An aq sat solution of Na₂CO₃ was introduced dropwise so that the temperature of mixture was maintained at –30 °C. The mixture was stirred for 0.5 h and raised to r.t. The aqueous layer was separated and extracted with CH₂Cl₂. The organic extracts were combined, washed with brine, dried over anhyd Na₂SO₄ and evaporated under reduced pressure. The residue was purified by flash column chromatography on silica gel to provide the isocyanide.

2.2 Method B: Preparation of α-isocyanoacetamide 2c and 2i

To methyl α-isocyanoacetate (4.4 mmol) was added morpholine (10.3 mmol, 2.3 equiv) and the reaction mixture was stirred at r.t. for 24 h. The crude material was purified by flash chromatography (SiO₂, EtOAc–petroleum ether = 2:1) to afford α-isocyanoacetamide 2i.

To a dry test tube containing CsOH·H₂O (0.34 mmol, 1.7 equiv) were added, under argon atmosphere, a solution of isocynoacetamide 2i (0.20 mmol) in MeCN (1.0 mL) and MeI (0.21 mmol) at 0 °C. The resulting reaction mixture was stirred at 0 °C. When the reaction was deemed complete, the volatile was removed under reduced pressure. Purification of the crude product by flash chromatography (silica gel) afforded the desired product α-isocyanoacetamide 2c.

3. Typical experimental procedure for the catalytic asymmetric reaction

A dry reaction tube was charged with Mg(OTf)₂ (0.012 mmol), L-RaPr₂ (0.01 mmol) and dimethyl 2-benzylidemalonate 1a (0.1 mmol). CH₂Cl₂ (1.0 mL) was added, and the mixture was stirred at 30 °C for 0.5 h. Subsequently, α-isocyanoacetamide 2e (0.15 mmol, 1.5 equiv) was added at 0 °C in one portion. After being stirred at 0 °C for 3 days, the crude reaction mixture was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 7/1) to afford the desired product 3ae as a white solid.

4. X-ray crystallographic structure of the product 3ae and proposed mechanism

The configuration of 3ae was determined to be R by single-crystal X-ray crystallographic analysis. Based on previous reports as well, a possible catalytic model has been proposed.
Single crystal of 3ae [C\textsubscript{23}H\textsubscript{30}N\textsubscript{2}O\textsubscript{6}] was obtained from the mixed solvents of ethyl acetate and petroleum ether. CCDC 1416058 contains the supplementary crystallographic data which can be obtained free of charge from The Cambridge Crystallographic Data Centre via [www.ccdc.cam.ac.uk/data_request/cif](http://www.ccdc.cam.ac.uk/data_request/cif).

a) Proposed catalytic cycle

b) HRMS and \textsuperscript{1}H NMR analysis of substrates and catalyst
(1) 2e in CDCl₃; (2) Mg(OTf)₂/L-RaPr₂/2e (1.2/1/1) in CDCl₃.

The mixture of L-RaPr₂ and Mg(OTf)₂ (1:1)
The mixture of L-RaPr$_2$, Mg(OTf)$_2$ and 1a (1:1:1)

As shown by the $^1$H NMR spectra, the proton signal of 1a was obviously affected by catalyst Mg(OTf)$_2$/L-RaPr$_2$. ESI-MS analysis confirmed the coordination of the substrate 1a to the catalyst.

c) Deuterium labeling studies
(1) 73% D; (2) 9% D; (3) 0% D.

As show by the deuterium labeling studies, the use of D-α-isocyanoacetamide led to surprisingly low deuterium labeling on the product (9%), the use of CDCl₃ resulted in no deuterium labeling on the product (0%), but a small amount of D₂O resulted in significant deuterium labeling on the product (73%). This interesting observation suggests that proton transfer is facilitated by a trace amount of water.

d) ¹H NMR monitoring reaction process
(1) 0 h. (2) 1 h. (3) 2 h. (4) 4 h. (5) 18 h. (6) 24 h.
As show by $^1$H NMR of the reaction mixture, no obvious intermediates were detected.

e) Operando IR experiments
As the peak at 1661 cm\(^{-1}\) related to \(\alpha\)-isocyanacetamide 2e, 1630, 1204, 1084 cm\(^{-1}\) related to methyl 2-benzylidenemalonate (1a), and 1758, 1117, 1030 cm\(^{-1}\) related to the product. As shown by the operando IR experiments, the product was formed gradually with disappearance of the substrates, and no intermediates were detected, indicating that the reaction must proceed by a concerted pathway.

5. **Optimization of the Reaction Conditions**

5.1 Screening of the metal salts and ligands
5.2 Screening of the solvents and reaction temperature

| Entry[a] | solvent | T [°C] | T [h] | Yield [%][b] | ee [%][c] |
|----------|---------|--------|------|-------------|----------|
| 1        | CH₂Cl₂  | 30     | 24   | 99          | 82       |
| 2        | THF     | 30     | 24   | trace       | -        |
| 3        | Et₂O    | 30     | 24   | 87          | 72       |
| 4        | Toluene | 30     | 24   | 71          | 69       |
| 5        | EtOAc   | 30     | 24   | N.R         | -        |
| 6        | CH₃CN   | 30     | 24   | 22          | 80       |
| 7        | CHCl₃   | 30     | 24   | 84          | 78       |
| 8        | ClCH₂CH₂Cl | 30 | 24   | 96          | 78       |
| 9        | Cl₂CH₂CH₂Cl | 30 | 24   | 88          | 77       |

[a] Unless specified otherwise, reactions were performed with Metal/L (1:1, 10 mol %), 1a (0.1 mmol), 2 (0.15 mmol) in 1.0 mL CH₂Cl₂. [b] Isolated yield. [c] Enantiomeric excess determined by HPLC analysis on a chiral stationary phase.
5.3 Other conditions

[Unless specified otherwise, reactions were performed with Mg(OTf)$_2$/L-RaPr$_2$ (1:1, 10 mol%), 1a (0.1 mmol), 2 (0.15 mmol) in 1.0 mL solvent. [b] Isolated yield. [c] Enantiomeric excess determined by HPLC analysis on a chiral stationary phase.]

### 6. Synthetic transformation of the products

| Entry$^a$ | R     | M/L | T [h] | Yield [%]$^b$ | ee [%]$^c$ |
|-----------|-------|-----|-------|---------------|------------|
| 1         | Bn(2a)| 1:1 | 48    | 63            | 86         |
| 2         | Ph(2b)| 1:1 | 48    | 86            | 87         |
| 3         | Ph(2b)| 1:2 | 60    | 79            | 87         |
| 4         | Ph(2b)| 1:1.5|60    | 80            | 87         |
| 5         | Ph(2b)| 1:1.2|60    | 85            | 87         |
| 6         | Ph(2b)| 1.2:1|60    | 99            | 87         |
| 7         | Ph(2b)| 1.5:1|60    | 99            | 86         |
| 8         | Ph(2b)| 2:1 | 60    | 99            | 86         |
| 9         | Me(2c)| 1:1 | 72    | 61            | 86         |
| 10        | iPr(2d)|1:1 | 72    | 91            | 89         |
| 11        | tBu(2e)|1:1 | 72    | 75            | 92         |
| 12        | tBu(2e)|1:1.1|72    | 46            | 92         |
| 13        | tBu(2e)|1:1.1|72    | 83            | 92         |
| 14        | tBu(2e)|1.2:1|72    | 91            | 92         |
| 15        | tBu(2e)|1.3:1|72    | 91            | 92         |
| 16        | tBu(2e)|1.4:1|72    | 90            | 91         |
| 17        | tBu(2e)|1.5:1|72    | 95            | 91         |

[a] Unless specified otherwise, reactions were performed with Mg(OTf)$_2$/L-RaPr$_2$ (10 mol%), 1a (0.1 mmol), 2 (0.15 mmol) in 1.0 mL solvent. [b] Isolated yield. [c] Enantiomeric excess determined by HPLC analysis on a chiral stationary phase.
To a solution of adduct 3ae (0.2 mmol, 1.0 equiv) in THF (2.0 mL) was added LiAlH₄ (38.0 mg, 5.0 equiv) at 0 º C. The mixture was allowed to stir at room temperature for 2 h. Excess of LiAlH₄ was quenched with NH₄Cl (sat.). The mixture was extracted with EtOAc, and the organic layer was dried over anhydrous Na₂SO₄ and then was evaporated by rotary evaporator. The residue was purified by column chromatography on silica gel (petroleum ether/ethyl acetate = 1/1) to afford 5 (67.2 mg, 90% yield) as a yellow oil.

To the solution of 5-aminoxazole 3ae (0.3 mmol, 1.0 equiv) in THF/H₂O (4:1, 0.05 M), TFA (50 equiv) was added and the reaction stirred at room temperature for 24 h. The reaction mixture was quenched with KHCO₃ (sat.) and extracted with EtOAc, dried with Na₂SO₄, filtered, and concentrated in vacuo. This crude mixture was then immediately purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 1/1) to afford the dipeptide 6.

To the solution of 5-aminoxazole 3ae (0.3 mmol, 1.0 equiv) in CH₃CN/H₂O (9:1, 0.05 M), ceric ammonium nitrate (4.0 equiv) was added. The reaction was allowed to stir until completion via TLC and then diluted with ethyl acetate and water. After extracting with ethyl acetate, the organic fractions were combined, washed with NaHCO₃ (sat.) and brine, dried with MgSO₄, filtered, and concentrated in vacuo. This crude mixture was then immediately purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 3/1) to afford the imide 7.

To the solution of imide 7 (0.4 mmol, 1.0 equiv) in DMSO (0.5 M) was added LiCl (2.1 equiv) and H₂O (1.1 equiv). The reaction was allowed to stir at 130 º C for 5h, and then quenched with EtOAc/H₂O, extracted with EtOAc, dried with Na₂SO₄, filtered, and concentrated in vacuo. This crude mixture was then immediately purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 1/1) to afford 8.
ether/ethyl acetate = 4/1) to afford the product 8.

To the solution of 5-aminoxazole 3ab (0.8 mmol, 1.0 equiv) in DMSO (0.5 M) was added LiCl (2.1 equiv) and H₂O (1.1 equiv). The reaction was allowed to stir at 130 °C for 5 h, and then quenched with EtOAc/H₂O, extracted with EtOAc, dried with Na₂SO₄, filtered, and concentrated in vacuo. This crude mixture was then immediately purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 4/1) to afford the product 9.

To the solution of 9 (0.3 mmol, 1.0 equiv) in CH₃CN/H₂O (9:1, 0.05 M), ceric ammonium nitrate (4.0 equiv) was added. The reaction was allowed to stir until completion via TLC and then diluted with ethyl acetate and water. After extracting with ethyl acetate, the organic fractions were combined, washed with NaHCO₃ (sat.) and brine, dried with MgSO₄, filtered, and concentrated in vacuo. This crude mixture was then immediately purified by flash chromatography on silica gel (petroleum ether/ethyl acetate = 3/1) to afford the imide 10.

To a solution of adduct 9 (0.2 mmol, 1.0 equiv) in THF (2.0 mL) was added LiAlH₄ (38.0 mg, 5.0 equiv) at 0 ºC. The mixture was allowed to stir at room temperature for 2 h. Excess of LiAlH₄ was quenched with NH₄Cl (sat.). The mixture was extracted with EtOAc, and the organic layer was dried over anhydrous Na₂SO₄ and then evaporated by rotary evaporator. The residue was purified by column chromatography on silica gel (petroleum ether/ethyl acetate = 2/1) to afford 11 as a yellow oil.

7. The analytical and spectral characterization data of the products

**dimethyl 2-((4-tert-butyl-5-morpholinoazol-2-yl)(phenyl)methyl)malonate 3ae**

(C₂₃H₃₆N₂O₆) white solid; 91% yield, 92% ee. [α]D²⁰ = −68.9 (c 1.36 in CH₂Cl₂). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 6.08 min (major), 8.60 min (minor). ¹H NMR (400 MHz, CDCl₃) δ 7.30 – 7.10 (m, 5H), 4.65 (d, J = 11.8 Hz, 1H), 4.29 (d, J = 11.8 Hz, 1H), 3.72 – 3.54 (m, 7H), 3.40 (s, 3H), 2.91 – 2.71 (m, 4H), 1.18 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ 166.95, 166.51, 156.34, 148.83, 135.64, 134.85, 127.59, 127.38, 126.70, 65.91, 55.48, 51.67, 51.47, 50.90, 44.16, 30.38, 28.59. ESI-HRMS: calcd for C₂₃H₃₆N₂NaO₆⁺ ([M+Na⁺]) 453.1996, found 453.2006.
diethyl 2-((4-tert-butyl-5-morpholino-oxazol-2-yl)(phenyl)methyl)malonate 3be

\[(\text{C}_{25}\text{H}_{34}\text{N}_{2}\text{O}_{6})\] colorless oil; 71% yield, 91% ee. \([\alpha]_{D}^{20} = -69.9 \text{ (c 0.61 in CH}_2\text{Cl}_2)\). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, \(\lambda = 254 \text{ nm}\), retention time: 7.15 min (minor), 7.83 min (major). \(^1\)H NMR (400 MHz, CDCl\textsubscript{3}) \(\delta\) 7.30 (dd, \(J = 7.0, 4.9 \text{ Hz, 4H}), 7.26 – 7.17 (m, 1H), 4.71 (d, \(J = 11.9 \text{ Hz, 1H}), 4.36 (d, \(J = 11.9 \text{ Hz, 1H}), 4.14 (q, \(J = 7.1 \text{ Hz, 2H}), 3.93 (q, \(J = 7.1 \text{ Hz, 2H}), 3.71 (dd, \(J = 5.4, 2.6 \text{ Hz, 4H}), 2.96 – 2.80 (m, 4H), 1.25 (s, 9H), 1.20 (t, \(J = 7.1 \text{ Hz, 3H}), 0.97 (t, \(J = 7.1 \text{ Hz, 3H}), \(^{13}\)C NMR (100 MHz, CDCl\textsubscript{3}) \(\delta\) 167.48, 167.23, 157.52, 149.74, 136.79, 135.92, 128.53, 127.63, 66.96, 61.57, 61.44, 56.75, 51.94, 45.14, 31.39, 29.63, 14.09, 13.71. ESI-HRMS: calcd for \(\text{C}_{25}\text{H}_{34}\text{N}_{2}\text{NaO}_{6}^+ ([\text{M+Na}^+])\) 481.2309, found 481.2310.

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| Retention Time | Area     | % Area | Height  |
|----------------|----------|--------|---------|
| 1              | 6.067    | 1421746| 51.57   |
|                | 8.179    | 1335127| 48.43   | 37211   |

| Retention Time | Area     | % Area | Height  |
|----------------|----------|--------|---------|
| 1              | 6.078    | 1722821| 96.09   |
|                | 8.599    | 70025  | 3.91    | 2309    |

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| Retention Time | Area     | % Area | Height  |
|----------------|----------|--------|---------|
| 1              | 7.415    | 1584312| 53.43   |
|                | 8.090    | 1380736| 46.57   | 81710   |
diisopropyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(phenyl)methyl)malonate 3ce

\( \text{C}_{27}\text{H}_{38}\text{N}_{2}\text{O}_{6} \) colorless oil; 41% yield, 82% ee. \( [\alpha]_D^{20} \approx -66.8 \) (c 0.37 in \( \text{CH}_2\text{Cl}_2 \)). HPLC DAICEL CHIRALCEL IE, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, \( \lambda = 254 \text{ nm} \), retention time: 5.44 min (minor), 6.12 min (major). \(^1\)H NMR (400 MHz, CDCl\(_3\)) \( \delta 7.35 – 7.26 \) (m, 1H), 7.25 – 7.20 (m, 4H), 4.97 (dt, \( J = 12.5, 6.3 \text{ Hz}, 1\text{H} \)), 4.77 (dt, \( J = 12.5, 6.3 \text{ Hz}, 1\text{H} \)), 4.69 (d, \( J = 12.0 \text{ Hz}, 1\text{H} \)), 4.33 (d, \( J = 12.0 \text{ Hz}, 1\text{H} \)), 3.72 (dd, \( J = 5.6, 3.1 \text{ Hz}, 4\text{H} \)), 2.94 – 2.82 (m, 4H), 1.25 (s, 9H), 1.22 (d, \( J = 6.3 \text{ Hz}, 3\text{H} \)), 1.14 (d, \( J = 6.3 \text{ Hz}, 3\text{H} \)), 1.07 (d, \( J = 6.3 \text{ Hz}, 3\text{H} \)), 0.87 (d, \( J = 6.3 \text{ Hz}, 3\text{H} \)). \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \( \delta 166.94, 166.78, 157.68, 149.63, 149.63, 136.89, 135.95, 128.62, 128.48, 127.55, 69.01, 68.95, 66.97, 57.02, 51.96, 44.97, 31.39, 29.65, 21.65, 21.50, 21.37, 21.18. ESI-HRMS: calcd for \( \text{C}_{27}\text{H}_{38}\text{N}_{2}\text{NaO}_{6}^+ \) ([M+\( \text{Na}^+ \)]) 509.2622, found 509.2627.

\[\text{dimethyl } \text{2-}((\text{4-(tert-butyl)-5-morpholinooxazol-2-yl})(\text{2-fluorophenyl})\text{methyl})\text{malonate } 3de\]
(C₂₃H₂₅FN₂O₈) colorless oil; 66% yield, 80% ee. [α]D²⁰ = −47.6 (c 0.59 in CH₂Cl₂). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 5.11 min (major), 7.95 min (minor). ¹H NMR (400 MHz, CDCl₃) δ 7.24 – 7.14 (m, 2H), 7.08 – 6.89 (m, 2H), 4.99 (d, J = 11.6 Hz, 1H), 4.36 (d, J = 11.6 Hz, 1H), 3.72 – 3.56 (m, 7H), 3.44 (s, 3H), 2.87 – 2.73 (m, 4H), 1.17 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ 167.90, 167.33, 16.53, 149.88, 135.98, 130.13 (d, J = 3.5 Hz), 129.53 (d, J = 8.2 Hz), 124.27 (d, J = 3.5 Hz), 123.83 (d, J = 14.1 Hz), 115.71 (d, J = 22.1 Hz), 66.92, 55.11, 52.66 (d, J = 17.2 Hz), 51.87, 38.49, 38.47, 31.40, 29.58. ESI-HRMS: calcd for C₂₃H₂₅FN₂NaO₆⁺ ([M+Na⁺]) 471.1902, found 471.1906.

![Graph 1](image1)

| Retention Time | Area     | % Area | Height  |
|---------------|----------|--------|---------|
| 1             | 5.134    | 958221 | 48.37   | 92577   |
| 2             | 7.321    | 1022875| 51.63   | 32732   |

![Graph 2](image2)

| Retention Time | Area     | % Area | Height  |
|---------------|----------|--------|---------|
| 1             | 5.111    | 2004271| 90.24   | 183963  |
| 2             | 7.947    | 216875 | 9.76    | 6447    |

dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(3-fluorophenyl)methyl)malonate 3ee

(C₂₃H₂₅FN₂O₈) white solid; 92% yield, 91% ee. [α]D²⁰ = −60.6 (c 0.79 in CH₂Cl₂). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 5.15 min (major), 9.62 min (minor). ¹H NMR (400 MHz, CDCl₃) δ 7.24 – 7.16 (m, 1H), 7.04 – 6.97 (m, 1H), 6.95 – 6.77 (m, 2H), 4.66 (d, J = 11.6 Hz, 1H), 4.27 (d, J = 11.6 Hz, 1H), 3.76 – 3.57 (m, 7H), 3.45 (s, 3H), 2.92 – 2.72 (m, 4H), 1.18 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ 167.74, 167.34, 162.72 (d, J = 245.0 Hz), 156.80, 150.01, 139.11 (d, J = 7.2 Hz), 136.04, 130.12 (d, J = 8.2 Hz), 124.3 (d, J = 2.9 Hz), 115.37 (d, J = 22.1 Hz), 114.80 (d, J = 20.9 Hz), 66.92, 56.30, 52.70 (d, J = 15.9 Hz), 51.91, 44.78, 44.76, 31.42, 29.58. ESI-HRMS: calcd for C₂₃H₂₅FN₂NaO₆⁺ ([M+Na⁺]) 471.1902, found 471.1904.
dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(3-chlorophenyl)methyl)malonate 3fe

(C_{23}H_{29}ClN_{2}O_{6}) white solid; 77 \% yield, 91\% ee. \([\alpha]_{D}^{20} = -57.6 (c 0.88 \text{ in CH}_2\text{Cl}_2).\) HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, \(\lambda = 254 \text{ nm},\) retention time: 5.30 min (major), 12.68 min (minor). \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta 7.25 - 7.06 (m, 4H), 4.63 (d, J = 11.6 \text{ Hz, 1H}), 4.26 (d, J = 11.6 \text{ Hz, 1H}), 3.45 (s, 3H), 2.90 - 2.73 (m, 4H), 1.18 (s, 9H). \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta 167.69, 167.29, 156.70, 150.03, 138.68, 136.07, 134.37, 129.87, 128.61, 128.01, 126.68, 66.92, 56.27, 52.77, 52.62, 51.91, 44.74, 31.42, 29.58.\) ESI-HRMS: calcd for C_{23}H_{29}^{34.9689}ClN_{2}NaO_{6}^+ ([M+Na^+]) 487.1606, found 487.1614, calcd for C_{23}H_{29}^{36.9659}ClN_{2}NaO_{6}^+ ([M+Na^+]) 489.1577, found 489.1602.

| Retention Time | Area      | % Area | Height  |
|----------------|-----------|--------|---------|
| 1              | 5.091     | 2169282| 50.02   |
| 2              | 8.527     | 2167955| 49.98   |

| Retention Time | Area      | % Area | Height  |
|----------------|-----------|--------|---------|
| 1              | 5.147     | 2108909| 95.61   |
| 2              | 9.620     | 96910  | 4.39    |

| Retention Time | Area      | % Area | Height  |
|----------------|-----------|--------|---------|
| 1              | 5.355     | 1897848| 50.10   |
| 2              | 11.921    | 1890580| 49.90   |

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dimethyl 2-((3-bromophenyl)(4-tert-butyl-5-morpholinoaxazol-2-yl)methyl)malonate 3ge

\( \text{C}_{23}\text{H}_{29}\text{BrN}_{2}\text{O}_{6} \) white solid; 96% yield, 91% ee. \([\alpha]_{D}^{20} = -54.5 \) (c 0.95 in \( \text{CH}_2\text{Cl}_2 \)). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, \( \lambda = 254 \) nm, retention time: 5.43 min (major), 12.94 min (minor). \(^1\)H NMR (400 MHz, \( \text{CDCl}_3 \)) \( \delta 7.45 – 7.26 \text{ (m, 2H), 7.18 – 7.04 \text{ (m, 2H), 4.62 \text{ (d, J = 11.6 Hz, 1H), 4.26 \text{ (d, J = 11.6 Hz, 1H), 3.71 – 3.58 \text{ (m, 7H), 3.46 \text{ (s, 3H), 2.92 – 2.75 \text{ (m, 4H), 1.18 \text{ (s, 9H).}}} \) 13C NMR (100 MHz, \( \text{CDCl}_3 \)) \( \delta 167.68, 167.28, 156.68, 150.04, 138.93, 136.07, 131.54, 130.94, 130.17, 127.13, 122.52, 66.92, 56.29, 52.79, 52.65, 51.91, 44.69, 31.42, 29.58. \) ESI-HRMS: calcd for \( \text{C}_{23}\text{H}_{29}\text{BrN}_{2}\text{O}_{6} \text{Na}^+ \) ([M+Na\(^+\)])) 530.1101, found 530.1103, calcd for \( \text{C}_{23}\text{H}_{32}\text{N}_{2}\text{O}_{6} \text{Na}^+ \) ([M+Na\(^+\)])) 533.1081, found 533.1090.

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| Retention Time | Area   | % Area | Height |
|----------------|--------|--------|--------|
| 1              | 5.494  | 50.55  | 119761 |
| 2              | 12.100 | 49.45  | 15943  |

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dimethyl 2-((4-tert-butyl-5-morpholinoaxazol-2-yl)(m-tolyl)methyl)malonate 3he

\( \text{C}_{24}\text{H}_{32}\text{N}_{2}\text{O}_{6} \) white solid; 66% yield, 94% ee. \([\alpha]_{D}^{20} = -68.1 \) (c 0.54 in \( \text{CH}_2\text{Cl}_2 \)). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, \( \lambda = 254 \) nm,
retention time: 5.12 min (major), 9.37 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.22 – 7.00 (m, 4H), 4.68 (d, $J = 11.8$ Hz, 1H), 4.35 (d, $J = 11.8$ Hz, 1H), 3.79 – 3.63 (m, 7H), 3.49 (s, 3H), 2.96 – 2.79 (m, 4H), 2.32 (s, 3H), 1.25 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.02, 167.56, 157.43, 149.78, 138.19, 136.58, 135.87, 129.18, 128.46, 125.33, 66.96, 56.55, 52.67, 52.48, 51.94, 45.13, 31.40, 29.61, 21.42. ESI-HRMS: calcd for C$_{24}$H$_{32}$N$_2$O$_7$ $^{+}$ ([M+Na$^+$]) 467.2153, found 467.2153.

| Retention Time | Area     | % Area | Height |
|----------------|----------|--------|--------|
| 1              | 5.119    | 394419 | 47.56  |
| 2              | 9.181    | 434855 | 52.44  |

dimethyl 2-((4-tert-butyl-5-morpholinoxazol-2-yl)(3-methoxyphenyl)methyl)malonate 3ie

(C$_{24}$H$_{32}$N$_2$O$_7$) colorless oil; 81% yield, 90% ee. $[\alpha]_D^{20} = -61.7$ (c 0.61 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: 6.47 min (major), 14.68 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.13 (t, $J = 7.8$ Hz, 1H), 6.74 (dt, $J = 8.0, 4.8$ Hz, 3H), 4.63 (d, $J = 11.8$ Hz, 1H), 4.29 (d, $J = 11.8$ Hz, 1H), 3.70 (s, 3H), 3.67 – 3.52 (m, 7H), 3.44 (s, 3H), 2.87 – 2.74 (m, 4H), 1.18 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.96, 167.50, 159.62, 157.28, 149.82, 138.13, 135.89, 129.57, 120.73, 113.86, 113.33, 66.95, 56.50, 55.15, 52.71, 52.57, 51.94, 45.11, 31.41, 29.60. ESI-HRMS: calcd for C$_{24}$H$_{32}$N$_2$NaO$_7$ $^{+}$ ([M+Na$^+$]) 483.2102, found 483.2104.
dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(3-phenoxyphenyl)methyl)malonate 3je

\[
\text{dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(3-phenoxyphenyl)methyl)malonate 3je}
\]

\[
\begin{array}{|c|c|c|c|}
\hline
1 & 6.418 & 1445120 & 47.41 \% & 104766 \\
2 & 12.972 & 1603287 & 52.59 \% & 17129 \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Retention Time} & \text{Area} & \% \text{Area} & \text{Height} \\
1 & 6.471 & 1476464 & 95.10 \% & 104441 \\
2 & 14.675 & 76019 & 4.90 \% & 1019 \\
\hline
\end{array}
\]

\[
\text{dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(3-phenoxyphenyl)methyl)malonate 3je}
\]

\[
\begin{array}{|c|c|c|}
\hline
\text{Retention Time} & \text{Area} & \% \text{Area} \\
1 & 5.435 & 1012736 \% & 95834 \\
2 & 6.302 & 1038796 \% & 53501 \\
\hline
\end{array}
\]
(C\textsubscript{23}H\textsubscript{29}FN\textsubscript{2}O\textsubscript{6}) \text{ white solid; 86\% yield, 93\% ee. } [\alpha]_{D}^{20} = -61.0 \ (c \ 1.61 \text{ in CH}_2\text{Cl}_2). \text{ HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, } \lambda = 254 \text{ nm, retention time: 5.62 min (major), 8.38 min (minor). } \text{ } \text{H NMR (400 MHz, CDCl}_3) \delta 7.23 – 7.14 \text{ (m, 2H), 6.91 (t, } J = 8.6 \text{ Hz, 2H), 4.64 (d, } J = 11.8 \text{ Hz, 1H), 4.26 (d, } J = 11.8 \text{ Hz, 1H), 3.64 (dd, } J = 6.7, 4.0 \text{ Hz, 7H), 3.43 (s, 3H), 2.91 – 2.72 \text{ (m, 4H), 1.18 (s, 9H). } \text{ } \text{C NMR (100 MHz, CDCl}_3) \delta 167.83, 167.47, 162.25 (d, } J = 245.0 \text{ Hz), 157.18, 149.92, 135.98, 132.45 (d, } J = 3.2 \text{ Hz, 1H), 130.08 (d, } J = 8.1 \text{ Hz, 1H), 115.56 (d, } J = 21.4 \text{ Hz, 66.92, 56.49, 52.75, 52.59, 51.91, 44.39, 31.41, 29.58. } \text{ } \text{ESI-HRMS: calcd for C}_{23}\text{H}_{29}\text{FN}_{2}\text{NaO}_{6}^{+} ([M+Na^{+}]) 471.1902, \text{ found 471.1907.}

\begin{tabular}{|c|c|c|c|}
\hline
Retention Time & Area & % Area & Height \\
\hline
1 & 5.607 & 800484 & 51.88 & 68206 \\
2 & 7.966 & 742378 & 48.12 & 20102 \\
\hline
\end{tabular}

\begin{tabular}{|c|c|c|c|}
\hline
Retention Time & Area & % Area & Height \\
\hline
1 & 5.617 & 1220150 & 96.45 & 103577 \\
2 & 8.381 & 44878 & 3.55 & 1138 \\
\hline
\end{tabular}

dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(4-chlorophenyl)methyl)malonate 3le
(C\textsubscript{23}H\textsubscript{29}ClN\textsubscript{2}O\textsubscript{6}) \text{ white solid; 96\% yield, 94\% ee. } [\alpha]_{D}^{20} = -52.3 \ (c \ 1.63 \text{ in CH}_2\text{Cl}_2). \text{ HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, } \lambda = 254 \text{ nm, retention time: 5.77 min (major), 11.68 min (minor). } \text{ } \text{H NMR (400 MHz, CDCl}_3) \delta 7.23 – 7.11 \text{ (m, 4H), 4.64 (d, } J = 11.6 \text{ Hz, 1H), 4.26 (d, } J = 11.6 \text{ Hz, 1H), 3.74 – 3.55 \text{ (m, 7H), 3.45 (s, 3H), 2.89 – 2.70 \text{ (m, 4H), 1.18 (s, 9H). } \text{ } \text{C NMR (100 MHz, CDCl}_3) \delta 167.75, 167.37, 156.93, 149.98, 136.03, 135.21, 133.69, 129.81, 128.84, 66.92, 56.28, 52.79, 52.65, 51.91, 44.49, 31.41, 29.58. } \text{ } \text{ESI-HRMS: calcd for C}_{23}\text{H}_{29}\text{ClN}_{2}\text{NaO}_{6}^{+} ([M+Na^{+}]) 487.1606, \text{ found 487.1612, calcd for C}_{23}\text{H}_{29}\text{ClN}_{2}\text{NaO}_{6}^{+} ([M+Na^{+}]) 489.1577, \text{ found 489.1602.}
dimethyl 2-((4-bromophenyl)(4-tert-butyl-5-morpholinoazol-2-yl)methyl)malonate 3me

\((\text{C}_{23}\text{H}_{29}\text{BrN}_{2}\text{O}_{6})\) white solid; 93% yield, 94% ee. \([\alpha]_{D}^{20} = -46.9\) (c 1.76 in \(\text{CH}_2\text{Cl}_2\)). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, \(\lambda = 254\) nm, retention time: 5.97 min (major), 14.11 min (minor). \(^1\)H NMR (400 MHz, CDCl\(_3\)) \(\delta\) 7.43 (d, \(J = 8.4\) Hz, 2H), 7.17 (d, \(J = 8.4\) Hz, 2H), 4.70 (d, \(J = 11.6\) Hz, 1H), 4.33 (d, \(J = 11.6\) Hz, 1H), 3.78 – 3.56 (m, 7H), 3.52 (s, 3H), 2.94 – 2.80 (m, 4H), 1.25 (s, 9H). \(^{13}\)C NMR (100 MHz, CDCl\(_3\)) \(\delta\) 167.74, 167.35, 156.86, 149.99, 136.02, 135.73, 131.80, 130.16, 121.88, 66.92, 56.21, 52.81, 52.68, 51.91, 44.54, 31.41, 29.58. ESI-HRMS: calcd for \(\text{C}_{23}\text{H}_{29}\text{BrN}_{2}\text{NaO}_{6}\)\(^+\) ([M+Na\(^+\)]) 530.1101, found 530.1102, calcd for \(\text{C}_{23}\text{H}_{29}\text{BrN}_{2}\text{NaO}_{6}\)\(^+\) ([M+Na\(^+\)]) 533.1081, found 533.1086.
Retention Time | Area  | % Area | Height
--- | --- | --- | ---
1 | 4.764 | 1016723 | 51.44
2 | 7.238 | 959801 | 48.56

Retention Time | Area  | % Area | Height
--- | --- | --- | ---
1 | 4.755 | 1110748 | 95.89
2 | 7.400 | 47573 | 4.11

dimethyl 2-(4-(tert-butyl-5-morpholinooxazol-2-yl)(4-trifluoromethyl)phenyl)methyl)malonate 3ne

(C$_{24}$H$_{29}$F$_{3}$N$_{3}$O$_{6}$) white solid; 86% yield, 92% ee. [α]$_D$ = −53.2 (c 1.80 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 4.76 min (major), 7.40 min (minor). H NMR (400 MHz, CDCl$_3$) δ 7.50 (d, $J$ = 8.2 Hz, 2H), 7.35 (d, $J$ = 8.1 Hz, 2H), 4.73 (d, $J$ = 11.7 Hz, 1H), 4.31 (d, $J$ = 11.7 Hz, 1H), 3.75–3.55 (m, 7H), 2.91–2.69 (m, 4H), 1.18 (s, 9H). C NMR (100 MHz, CDCl$_3$) δ 167.63, 167.24, 156.57, 150.11, 140.72, 136.15, 130.01 (q, $J$ = 32.3 Hz), 128.90, 125.50 (d, $J$ = 3.8 Hz), 121.62, 69.90, 56.15, 52.85, 52.67, 51.90, 44.82, 31.43, 29.66. ESI-HRMS: calcd for C$_{24}$H$_{29}$F$_{3}$N$_{3}$O$_{6}$Na$^+$ ([M+Na$^+$]), 531.1870, found 531.1870.

dimethyl 2-(4-(tert-butyl-5-morpholinooxazol-2-yl)(4-cyanophenyl)methyl)malonate 3ne

(C$_{24}$H$_{29}$N$_{3}$O$_{6}$) white solid; 98% yield, 94% ee. [α]$_D$ = −48.2 (c 1.72 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 4.31 min (major), 4.45 min (minor). H NMR (400 MHz, CDCl$_3$) δ 7.95 (d, $J$ = 8.4 Hz, 2H), 7.35 (d, $J$ = 8.1 Hz, 2H), 4.73 (d, $J$ = 11.7 Hz, 1H), 4.31 (d, $J$ = 11.7 Hz, 1H), 3.75–3.55 (m, 7H), 2.91–2.69 (m, 4H), 1.18 (s, 9H). C NMR (100 MHz, CDCl$_3$) δ 167.63, 167.24, 156.57, 150.11, 140.72, 136.15, 130.01 (q, $J$ = 32.3 Hz), 128.90, 125.50 (d, $J$ = 3.8 Hz), 121.62, 69.90, 56.15, 52.85, 52.67, 51.90, 44.82, 31.43, 29.66. ESI-HRMS: calcd for C$_{24}$H$_{29}$N$_{3}$O$_{6}$Na$^+$ ([M+Na$^+$]), 521.1870, found 521.1870.
80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 9.58 min (major), 12.73 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.54 (d, $J = 8.2$ Hz, 2H), 7.35 (d, $J = 8.2$ Hz, 2H), 4.72 (d, $J = 11.7$ Hz, 1H), 4.29 (d, $J = 11.7$ Hz, 1H), 3.64 (s, 7H), 3.45 (s, 3H), 2.92 – 2.68 (m, 4H), 1.18 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.44, 167.12, 156.15, 150.24, 142.04, 136.28, 132.45, 129.35, 118.87, 66.87, 55.94, 52.91, 52.75, 51.88, 44.96, 31.44, 29.55. ESI-HRMS: calcd for C$_{21}$H$_{29}$N$_3$NaO$_6$+ ([M+Na$^+$]) 478.1949, found 478.1956.

| Retention Time | Area  | % Area | Height |
|----------------|-------|--------|--------|
| 1              | 9.473 | 2258384| 50.40  |
| 2              | 12.171| 2222357| 49.60  |

dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(4-nitrophenyl)methyl)malonate 3pe (C$_{22}$H$_{29}$N$_3$O$_8$) white solid; 91% yield, 94% ee. $[\alpha]_D^{20} = -51.5$ (c 0.85 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 7.26 min (major), 12.42 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 8.10 (d, $J = 8.7$ Hz, 2H), 7.42 (d, $J = 8.7$ Hz, 2H), 4.79 (d, $J = 11.6$ Hz, 1H), 4.32 (d, $J = 11.6$ Hz, 1H), 3.74 – 3.57 (m, 7H), 3.46 (s, 3H), 2.92 – 2.67 (m, 4H), 1.18 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.41, 167.08, 156.04, 150.30, 147.53, 144.00, 136.35, 129.53, 123.87, 66.87, 55.94, 52.97, 52.82, 51.88, 44.71, 31.45, 29.55. ESI-HRMS: calcd for C$_{21}$H$_{29}$N$_3$NaO$_6$+ ([M+Na$^+$]) 498.1847, found 498.1858.

| Retention Time | Area  | % Area | Height |
|----------------|-------|--------|--------|
| 1              | 9.576 | 5169436| 97.23  |
| 2              | 12.731| 147491 | 2.77   |

| Retention Time | Area  | % Area | Height |
|----------------|-------|--------|--------|
| 1              | 6.990 | 3354989| 53.51  |
| 2              | 11.335| 2915005| 46.49  |
dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(p-tolyl)methyl)malonate 3qe

(C_{24}H_{32}N_{2}O_{6}) colorless oil; 83% yield, 94% ee. [α]_D^{20} = −63.2 (c 1.29 in CHCl_3). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 6.84 min (major), 17.80 min (minor). ¹H NMR (400 MHz, CDCl_3) δ 7.13 (dd, J = 28.0, 8.0 Hz, 4H), 4.69 (d, J = 11.8 Hz, 1H), 4.34 (d, J = 11.8 Hz, 1H), 3.80 – 3.63 (m, 7H), 3.50 (s, 3H), 2.96 – 2.80 (m, 4H), 2.30 (s, 3H), 1.25 (s, 9H). ¹³C NMR (100 MHz, CDCl_3) δ 168.04, 167.57, 157.53, 149.76, 137.35, 135.83, 133.63, 129.32, 128.23, 66.95, 56.58, 52.68, 52.52, 51.93, 44.82, 31.39, 29.61, 21.10. ESI-HRMS: calcd for C_{24}H_{32}N_{2}NaO_{6}^{+} ([M+Na^{+}] a 467.2153, found 467.2154.

HPLC CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 10.82 min (major), 13.34 min (minor). ¹H NMR (400 MHz, CDCl_3) δ 7.55 (dd, J = 168.04, 167.57, 157.53, 149.76, 137.35, 135.83, 133.63, 129.32, 128.23, 66.95, 56.58, 52.68, 52.52, 51.93, 44.82, 31.39, 29.61, 21.10. ESI-HRMS: calcd for C_{29}H_{34}N_{2}O_{6} ([M+Na^{+}] a 470.2121, found 470.2122.

dimethyl 2-(biphenyl-4-yl)(4-tert-butyl-5-morpholinooxazol-2-yl)methyl)malonate 3re

(C_{29}H_{34}N_{2}O_{4}) white solid; 98% yield, 91% ee. [α]_D^{20} = −42.9 (c 3.14 in CHCl_3). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 10.82 min (major), 13.34 min (minor). ¹H NMR (400 MHz, CDCl_3) δ 7.55 (dd, J = 28.0, 8.0 Hz, 4H), 4.69 (d, J = 11.8 Hz, 1H), 4.34 (d, J = 11.8 Hz, 1H), 3.80 – 3.63 (m, 7H), 3.50 (s, 3H), 2.96 – 2.80 (m, 4H), 2.30 (s, 3H), 1.25 (s, 9H). ¹³C NMR (100 MHz, CDCl_3) δ 168.04, 167.57, 157.53, 149.76, 137.35, 135.83, 133.63, 129.32, 128.23, 66.95, 56.58, 52.68, 52.52, 51.93, 44.82, 31.39, 29.61, 21.10. ESI-HRMS: calcd for C_{29}H_{34}N_{2}NaO_{4}^{+} ([M+Na^{+}] a 470.2121, found 470.2122.
= 12.0, 7.9 Hz, 4H), 7.37 (qd, J = 15.1, 7.4 Hz, 5H), 4.79 (d, J = 11.8 Hz, 1H), 4.41 (d, J = 11.8 Hz, 1H), 3.71 (d, J = 5.9 Hz, 7H), 3.51 (s, 3H), 3.01 – 2.77 (m, 4H), 1.32 – 1.22 (m, 9H).

$^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.97, 167.57, 157.32, 149.91, 140.49, 140.45, 135.96, 135.70, 128.85, 128.80, 127.42, 127.29, 126.99, 66.96, 56.50, 52.76, 52.61, 51.96, 44.87, 31.44, 29.65. ESI-HRMS: calcd for C$_{29}$H$_{35}$N$_2$O$_6$ $^{+}$ ([M+H$^+$]) 507.2490, found 507.2488.

dimethyl 2-((4-tert-butyl-5-morpholinoaxazol-2-yl)(4-methoxyphenyl)methyl)malonate 3se

(C$_{24}$H$_{32}$N$_2$O$_7$) colorless oil; 87% yield, 96% ee. [α]$_D^{20}$ = -64.7 (c 0.73 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 8.03 min (major), 18.26 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.23 – 7.11 (m, 2H), 6.89 – 6.65 (m, 2H), 4.68 (d, J = 11.6 Hz, 1H), 4.32 (d, J = 11.6 Hz, 1H), 3.77 (s, 3H), 3.76 – 3.62 (m, 7H), 3.51 (s, 3H), 3.03 – 2.70 (m, 4H), 1.25 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.03, 167.63, 159.02, 157.62, 149.75, 135.84, 129.48, 128.70, 113.97, 66.96, 56.66, 55.17, 52.67, 52.54, 51.93, 44.43, 31.39, 29.65. ESI-HRMS: calcd for C$_{29}$H$_{35}$N$_2$O$_6$$^{+}$ ([M+Na$^+$]) 483.2102, found 483.2106.
dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(4-phenoxyphenyl)methyl)malonate 3te

(C_{29}H_{34}N_{2}O_{7}) colorless oil; 64% yield, 92% ee. [α]_{D}^{20} = -50.3 (c 0.66 in CH_{2}Cl_{2}). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 6.77 min (major), 9.90 min (minor). ^1H NMR (400 MHz, CDCl_{3}) δ 7.37 – 7.28 (m, 2H), 7.23 (d, J = 8.6 Hz, 2H), 7.17 – 7.06 (m, 1H), 7.04 – 6.87 (m, 4H), 4.72 (d, J = 11.6 Hz, 1H), 4.34 (d, J = 11.6 Hz, 1H), 3.79 – 3.64 (m, 7H), 3.53 (s, 3H), 2.98 – 2.79 (m, 4H), 1.25 (s, 9H). ^13C NMR (100 MHz, CDCl_{3}) δ 167.93, 167.57, 157.37, 156.97, 156.73, 149.86, 135.93, 131.24, 129.78, 129.77, 123.57, 119.21, 118.56, 66.96, 56.64, 52.72, 52.58, 51.94, 44.50, 31.42, 29.61. ESI-HRMS: calcld for C_{29}H_{35}N_{2}O_{7}^+ ([M+H^+]) 523.2439, found 523.2440.

dimethyl 2-((4-(benzyl oxy)phenyl)(4-tert-butyl-5-morpholinooxazol-2-yl)methyl)malonate 3ue

(C_{30}H_{36}N_{2}O_{7}) colorless oil; 64% yield, 92% ee. [α]_{D}^{20} = -49.7 (c 0.66
in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $\lambda$ = 254 nm, retention time: 9.38 min (major), 10.91 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.53 – 7.28 (m, 5H), 7.24 – 7.11 (m, 2H), 6.99 – 6.78 (m, 2H), 5.02 (s, 2H), 4.68 (d, $J$ = 11.6 Hz, 1H), 4.32 (d, $J$ = 11.6 Hz, 1H), 3.82 – 3.59 (m, 7H), 3.49 (s, 3H), 2.99 – 2.73 (m, 4H), 1.25 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.02, 167.64, 158.28, 157.59, 149.77, 136.87, 135.86, 129.53, 128.99, 128.59, 128.02, 127.53, 114.91, 69.98, 66.97, 56.87, 52.67, 52.53, 51.94, 44.46, 31.41, 29.62. ESI-HRMS: calcd for C$_{30}$H$_{36}$N$_2$NaO$_7$+ ([M+Na$^+$]) 559.2415, found 559.2421.

| Retention Time | Area   | % Area | Height |
|----------------|--------|--------|--------|
| 1              | 9.192  | 323290 | 46.31  | 17913  |
| 2              | 10.399 | 374805 | 53.69  | 10934  |

dimethyl

2-((4-(tert-butyl)-5-morpholino-oxazol-2-yl)(3,4-dichlorophenyl)methyl)malonate 3ve

(C$_{23}$H$_{28}$Cl$_2$N$_2$O$_6$) colorless oil; 90% yield, 92% ee. [a]$_D$$^{20}$ = −42.1 (c 0.86 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, $\lambda$ = 254 nm, retention time: 5.03 min (major), 24.56 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.32 (dd, $J$ = 10.5, 5.2 Hz, 2H), 7.07 (dd, $J$ = 8.3, 2.1 Hz, 1H), 4.62 (d, $J$ = 11.7 Hz, 1H), 4.24 (d, $J$ = 11.7 Hz, 1H), 3.71 – 3.58 (m, 7H), 3.49 (s, 3H), 2.87 – 2.75 (m, 4H), 1.18 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 166.50, 166.15, 155.38, 149.12, 135.91, 135.18, 131.65, 131.03, 129.59, 129.49, 126.85, 65.90, 55.11, 51.82, 51.75, 50.90, 43.16, 30.42, 28.55. ESI-HRMS: calcd for C$_{23}$H$_{34}$Cl$_{36}$N$_4$NaO$_{15}$+ ([M+Na$^+$]) 521.1217, found 521.1229, calcd for C$_{23}$H$_{34}$Cl$_{36}$N$_4$NaO$_{15}$+ ([M+Na$^+$]) 523.1187, found 523.1215.
dimethyl 2-((4-tert-butyl-5-morpholinooxazol-2-yl)(naphthalen-2-yl)methyl)malonate 3we

\[(\text{C}_{27}\text{H}_{32}\text{N}_{2}\text{O}_6)\text{] colorless oil; 81% yield, 90% ee, } [\alpha]_D^{20} = -51.1 \text{ (c 0.74 in CH}_2\text{Cl}_2). \text{ HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, }\lambda = 254 \text{ nm, retention time: 6.20 min (major), 22.16 min (minor).} \]

\[\text{H NMR (400 MHz, CDCl}_3\text{) }\delta 7.80 - 7.72 (m, 4H), 7.51 - 7.40 (m, 4H), 7.02 - 7.00 (m, 2H), 4.91 (d, } J = 11.8 \text{ Hz, 1H), 4.50 (d, } J = 11.8 \text{ Hz, 1H), 3.77 - 3.62 (m, 7H), 3.42 (s, 3H), 2.86 (t, } J = 4.6 \text{ Hz, 4H).} \]

\[\text{C}^{13}\text{NMR (100 MHz, CDCl}_3\text{) }\delta 168.01, 157.38, 149.91, 135.98, 134.12, 133.30, 128.40, 128.00, 127.73, 127.64, 126.22, 126.15, 125.91, 66.94, 56.38, 52.76, 52.57, 51.93, 45.31, 31.44, 29.63. \text{ ESI-HRMS: caled for } \text{C}_{27}\text{H}_{32}\text{N}_{2}\text{NaO}_6^{+} ([M+Na^+]) \text{ 503.2153, found 503.2159.} \]

| Retention Time | Area      | % Area | Height  |
|----------------|-----------|--------|---------|
| 1              | 5.109     | 51.98  | 232898  |
| 2              | 22.934    | 48.02  | 10306   |

| Retention Time | Area      | % Area | Height  |
|----------------|-----------|--------|---------|
| 1              | 5.031     | 95.97  | 319822  |
| 2              | 24.558    | 4.03   | 767     |

| Retention Time | Area      | % Area | Height  |
|----------------|-----------|--------|---------|
| 1              | 6.353     | 50.12  | 311744  |
| 2              | 20.158    | 49.88  | 21136   |
dimethyl 2-((4-(tert-butyl)-5-morpholinoaxazol-2-yl)(thiophen-2-yl)methyl)malonate 3xe

(C_{21}H_{32}N_{2}O_{6}S) white solid; 28% yield, 85% ee. [α]_{D}^{20} = −46.3 (c 0.24 in CH_{2}Cl_{2}). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 9.27 min (major), 11.40 min (minor). ¹H NMR (400 MHz, CDCl₃) δ 7.17 – 7.08 (m, 1H), 6.91 – 6.79 (m, 2H), 5.00 (d, J = 11.5 Hz, 1H), 4.27 (d, J = 11.5 Hz, 1H), 3.70 – 3.63 (m, 4H), 3.61 (s, 3H), 3.54 (s, 3H), 2.89 – 2.80 (m, 4H), 1.18 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ 166.43, 166.29, 155.59, 148.92, 138.09, 135.10, 125.73, 125.61, 124.53, 65.92, 56.21, 51.73, 50.93, 39.43, 30.41, 28.57. ESI-HRMS: calcd for C_{21}H_{28}N_{2}NaO_{6}S⁺ ([M+Na⁺]) 459.1560, found 459.1567.

dimethyl 2-((4-(tert-butyl)-5-morpholinoaxazol-2-yl)(furan-3-yl)methyl)malonate 3ye

(C_{21}H_{30}N_{2}O_{7}) yellow oil; 76% yield, 89% ee. [α]_{D}^{20} = −32.6 (c 0.82 in CH_{2}Cl_{2}). HPLC DAICEL CHIRALCEL IE, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 6.10 min (minor), 6.97 min (major). ¹H NMR (400 MHz, CDCl₃) δ 7.52 – 7.41 (m, 2H), 7.33 (d, J = 8.0 Hz, 1H), 7.19 (d, J = 8.0 Hz, 1H), 7.12 – 7.00 (m, 2H), 5.00 (d, J = 11.5 Hz, 1H), 4.27 (d, J = 11.5 Hz, 1H), 3.70 – 3.63 (m, 4H), 3.61 (s, 3H), 3.54 (s, 3H), 2.89 – 2.80 (m, 4H), 1.18 (s, 9H).
MHz, CDCl$_3$) δ 7.33 (dd, $J = 6.0, 4.4$ Hz, 2H), 6.33 (d, $J = 0.9$ Hz, 1H), 4.73 (d, $J = 11.2$ Hz, 1H), 4.21 (d, $J = 11.2$ Hz, 1H), 3.79 – 3.71 (m, 4H), 3.66 (d, $J = 0.9$ Hz, 1H), 4.73 (d, $J = 11.2$ Hz, 1H), 4.21 (d, $J = 11.2$ Hz, 1H), 3.79 – 3.71 (m, 4H), 3.66 (d, $J = 0.9$ Hz, 1H), 4.73 (d, $J = 11.2$ Hz, 1H), 4.21 (d, $J = 11.2$ Hz, 1H), 3.79 – 3.71 (m, 4H), 3.66 (d, $J = 0.9$ Hz, 1H),

$^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.66, 167.62, 156.88, 149.76, 143.05, 140.55, 136.02, 121.07, 110.05, 66.96, 56.02, 52.72, 52.68, 51.95, 36.26, 31.40, 29.60.

ESI-HRMS: calcd for C$_{21}$H$_{28}$N$_2$O$_7^+$ ([M+Na$^+$]) 443.1789, found 443.1792.

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**dimethyl 2-((4-(tert-butyl)-5-morpholinoxazol-2-yl)(cyclohexyl)methyl)malonate 3ze**

(C$_{23}$H$_{36}$N$_2$O$_6$) colorless oil; 81% yield, 86% ee. $[\alpha]_D^{20} = -13.8$ (c 0.81 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: 5.78 min (major), 8.30 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 4.09 (d, $J = 11.3$ Hz, 1H), 3.83 – 3.71 (m, 7H), 3.60 (s, 3H), 3.49 (dd, $J = 11.3, 4.1$ Hz, 1H), 3.01 – 2.89 (m, 4H), 1.95 – 1.44 (m, 7H), 1.24 (s, 9H), 1.17 – 0.91 (m, 3H), 0.80 – 0.58 (m, 1H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.64, 168.43, 157.68, 149.18, 135.54, 66.98, 52.73, 52.49, 52.01, 44.72, 39.65, 31.88, 31.31, 29.61, 28.26, 26.61, 26.32, 26.23. ESI-HRMS: calcd for C$_{23}$H$_{36}$N$_2$O$_6^+$ ([M+Na$^+$]) 459.2466, found 459.2466.
| Retention Time | Area    | % Area | Height |
|----------------|---------|--------|--------|
| 1              | 5.777   | 93.14  | 68203  |
| 2              | 8.297   | 6.86   | 2231   |

**dimethyl 2-(1-(4-(tert-butyl)-5-morpholinoxazol-2-yl)ethyl)malonate 4ae**

(C$_{18}$H$_{28}$N$_2$O$_6$) colorless oil; 83% yield, 72% ee. $\left[\alpha\right]_{D}^{20} = -6.0$ (c 1.30 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: 6.65 min (major), 7.67 min (minor).

$^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 3.77 (d, $J = 9.6$ Hz, 1H), 3.73 – 3.65 (m, 7H), 3.61 (s, 3H), 3.59 – 3.50 (m, 1H), 2.93 – 2.82 (m, 4H), 1.27 (d, $J = 7.0$ Hz, 3H), 1.18 (s, 9H).

$^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.28, 168.25, 159.11, 149.42, 135.83, 66.99, 55.46, 52.58, 52.57, 52.53, 51.95, 34.09, 31.33, 29.61, 16.19. ESI-HRMS: calcd for C$_{18}$H$_{28}$N$_2$O$_6$ $^{+}$ ([M+Na$^+$]) 391.1840, found 391.1841.

| Retention Time | Area      | % Area | Height |
|----------------|-----------|--------|--------|
| 1              | 6.832     | 50.10  | 104686 |
| 2              | 7.591     | 49.90  | 68615  |

**dimethyl 2-((4-benzyl-5-morpholinoxazol-2-yl)(phenyl)methyl)malonate 3aa**

(C$_{26}$H$_{28}$N$_2$O$_6$) yellow oil; 85% yield, 86% ee. $\left[\alpha\right]_{D}^{20} = -54.4$ (c 1.00 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL IA, n-hexane/2-propanol = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: 6.20 min (minor), 6.78 min (major). $^1$H NMR (400
MHz, CDCl$_3$) $\delta$ 7.24 – 7.15 (m, 7H), 7.14 – 7.04 (m, 3H), 4.67 (d, $J = 11.9$ Hz, 1H), 4.32 (d, $J = 11.9$ Hz, 1H), 3.71 (s, 2H), 3.52 (s, 3H), 3.39 (s, 3H), 2.82 (dd, $J = 5.2, 4.3$ Hz, 4H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 167.91, 167.48, 157.74, 152.20, 139.62, 136.37, 128.70, 128.40, 128.38, 128.29, 127.85, 126.06, 124.37, 66.83, 56.19, 52.73, 52.53, 50.99, 45.03, 31.58.

ESI-HRMS: calcd for C$_{26}$H$_{28}$N$_2$O$_6^+$ ([M+Na$^+$]) 487.1840, found 487.1847.

### Retention Time | Area | % Area | Height
--- | --- | --- | ---
1 | 6.169 | 2786715 | 48.20 | 263673
2 | 6.758 | 2995297 | 51.80 | 266757

### Retention Time | Area | % Area | Height
--- | --- | --- | ---
1 | 6.203 | 463594 | 6.75 | 45526
2 | 6.779 | 6404518 | 93.25 | 572680

**dimethyl 2-((5-morpholino-4-phenyloxazol-2-yl)(phenyl)methyl)malonate 3ab**

(C$_{25}$H$_{26}$N$_2$O$_6$) white solid; 97% yield, 86% ee. $[\alpha]_{D}^{20} = -127.7$ (c 0.83 in CH$_3$Cl). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: 9.06 min (minor), 12.13 min (major). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.84 (dd, $J = 8.2, 1.0$ Hz, 2H), 7.35 – 7.11 (m, 8H), 4.73 (d, $J = 11.8$ Hz, 1H), 4.41 (d, $J = 11.8$ Hz, 1H), 3.71 (t, $J = 4.7$ Hz, 4H), 3.65 (s, 3H), 3.40 (s, 3H), 3.02 – 2.89 (m, 4H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 168.00, 167.51, 157.62, 151.10, 136.27, 131.96, 128.72, 128.45, 128.39, 127.93, 126.88, 125.91, 123.94, 66.89, 56.28, 52.90, 52.89, 52.56, 50.34, 44.97. ESI-HRMS: calcd for C$_{25}$H$_{26}$N$_2$O$_6^+$ ([M+Na$^+$]) 473.1683, found 473.1688.

### Retention Time | Area | % Area | Height
--- | --- | --- | ---
1 | 9.148 | 7573212 | 50.08 | 347786
dimethyl 2-((4-methyl-5-morpholinooxazol-2-yl)(phenyl)methyl)malonate 3ac

(C_{20}H_{24}N_{2}O_{6}) colorless oil; 60% yield, 86% ee. [α]D^{20} = -73.9 (c 0.56 in CH₂Cl₂). HPLC DAICEL CHIRALCEL IC, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 9.51 min (minor), 14.12 min (major). ^1H NMR (400 MHz, CDCl₃) δ 7.34 – 7.21 (m, 5H), 4.72 (d, J = 11.9 Hz, 1H), 4.40 (d, J = 11.9 Hz, 1H), 3.79 – 3.64 (m, 7H), 3.00 – 2.89 (m, 4H), 2.05 (s, 3H). ^13C NMR (100 MHz, CDCl₃) δ 167.94, 167.50, 157.13, 151.43, 136.46, 128.67, 128.34, 127.81, 121.23, 66.89, 55.95, 52.84, 52.52, 50.86, 44.93, 11.17. ESI-HRMS: calcld for C_{20}H_{24}N_{2}NaO_{6}⁺ ([M+Na⁺]) 411.1527, found 411.1529.

dimethyl 2-((4-isopropyl-5-morpholinooxazol-2-yl)(phenyl)methyl)malonate 3ad

(C_{22}H_{28}N_{2}O_{6}) yellow oil; 99% yield, 89% ee. [α]D^{20} = -65.8 (c 0.88 in CH₂Cl₂). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm,
Retention time: 7.18 min (major), 10.88 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.32 – 7.22 (m, 5H), 4.73 (d, $J = 11.8$ Hz, 1H), 4.38 (d, $J = 11.8$ Hz, 1H), 3.78 – 3.65 (m, 7H), 3.47 (s, 3H), 2.96 – 2.88 (m, 4H), 2.82 (dt, $J = 13.8$, 6.9 Hz, 1H), 1.17 (dd, $J = 9.3$, 6.9 Hz, 6H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.94, 167.51, 157.50, 150.11, 136.64, 132.18, 128.62, 128.39, 127.73, 66.94, 56.37, 52.71, 52.49, 51.53, 45.19, 25.32, 22.00, 21.75. ESI-HRMS: calcd for $C_{22}H_{28}N_2O_6^+$ ([M+Na$^+$]) 439.1840, found 439.1840.

**dimethyl 2-((4-benzyl-5-(piperidin-1-yl)oxazol-2-yl)(phenyl)methyl)malonate 3af**

(C$_{27}$H$_{30}$N$_2$O$_5$) yellow oil; 86% yield, 86% ee. $[\alpha]_D^{20} = -77.9$ ($c$ 0.89 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: 9.89 min (major), 10.93 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.33 – 7.12 (m, 10H), 4.73 (d, $J = 12.0$ Hz, 1H), 4.39 (d, $J = 12.0$ Hz, 1H), 3.77 (d, $J = 1.5$ Hz, 2H), 3.57 (s, 3H), 3.45 (s, 3H), 2.95 – 2.79 (m, 4H), 1.64 – 1.33 (m, 6H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.90, 167.58, 157.07, 153.70, 140.01, 136.61, 128.64, 128.43, 128.40, 128.20, 127.73, 125.88, 123.10, 56.27, 52.68, 52.49, 52.06, 45.09, 31.61, 25.86, 23.84. ESI-HRMS: calcd for $C_{27}H_{30}N_2O_5$ ([M+Na$^+$]) 485.2047, found 485.2050.
dimethyl 2-((4-(tert-butyl)-5-(piperidin-1-yl)oxazol-2-yl)(phenyl)methyl)malonate 3ag
(C$_{24}$H$_{32}$N$_{2}$O$_{5}$) colorless oil; 91% yield, 91% ee. [α]$_{D}^{20}$ = −58.4 (c 0.75 in CH$_{2}$Cl$_{2}$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 4.91 min (major), 6.13 min (minor). $^1$H NMR (400 MHz, CDCl$_{3}$) δ 7.23–7.14 (m, 5H), 4.64 (d, $J = 11.8$ Hz, 1H), 4.28 (d, $J = 11.8$ Hz, 1H), 3.61 (s, 3H), 3.40 (s, 3H), 2.73 (t, $J = 5.3$ Hz, 4H), 1.56–1.36 (m, 6H), 1.17 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_{3}$) δ 166.96, 166.64, 155.75, 150.45, 135.94, 133.79, 127.52, 127.42, 126.58, 55.64, 51.87, 51.65, 51.43, 44.28, 30.30, 28.56, 24.90, 22.84. ESI-HRMS: calcd for C$_{24}$H$_{32}$N$_{2}$NaO$_{5}$+ ([M+Na$^+$]) 451.2203, found 451.2204.

dimethyl 2-((4-(tert-butyl)-5-(pyrrolidin-1-yl)oxazol-2-yl)(phenyl)methyl)malonate 3ah
(C$_{23}$H$_{30}$N$_{2}$O$_{5}$) yellow oil; 80% yield, 91% ee. [α]$_{D}^{20}$ = −70.2 (c 0.75 in CH$_{2}$Cl$_{2}$). HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 5.08
min (major), 7.56 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.25 – 7.13 (m, 5H), 4.64 (d, $J$ = 11.8 Hz, 1H), 4.30 (d, $J$ = 11.8 Hz, 1H), 3.62 (s, 3H), 3.40 (s, 3H), 3.00 – 2.83 (m, 4H), 1.82 – 1.71 (m, 4H), 1.16 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 168.04, 167.67, 156.71, 148.51, 136.99, 136.46, 128.54, 128.45, 127.60, 56.61, 52.67, 52.44, 45.31, 31.31, 29.51, 25.37. ESI-HRMS: calcd for C$_{23}$H$_{30}$N$_2$NaO$_5$$^+$ ([M+Na$^+$]) 437.2047, found 437.2048.

dimethyl 2-((5-morpholinoxazol-2-yl)(phenyl)methyl)malonate 3ai

(C$_{19}$H$_{22}$N$_2$O$_6$) colorless oil; 62% yield, 87% ee. [α]$_D^{20}$ = −46.3 (c 0.46 in CH$_2$Cl$_2$). HPLC DAICEL CHIRALCEL IE, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 11.77 min (major), 15.03 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) δ 7.34 – 7.22 (m, 5H), 5.95 (s, 1H), 4.75 (d, $J$ = 11.9 Hz, 1H), 4.38 (d, $J$ = 11.9 Hz, 1H), 3.80 – 3.68 (m, 7H), 3.46 (s, 3H), 3.08 – 2.91 (m, 4H). $^{13}$C NMR (100 MHz, CDCl$_3$) δ 167.95, 167.46, 157.33, 155.76, 136.40, 128.72, 128.32, 127.88, 102.86, 65.93, 56.06, 52.95, 52.55, 48.22, 44.61. ESI-HRMS: calcd for C$_{19}$H$_{22}$N$_2$NaO$_6^+$ ([M+Na$^+$]) 397.1370, found 397.1375.
2-((4-(tert-butyl)-5-morpholinooxazol-2-yl)(phenyl)methyl)propane-1,3-diol 5

(C$_{21}$H$_{30}$N$_{2}$O$_{4}$) yellow oil; 90% yield, 95% ee. HPLC DAICEL CHIRALCEL IC, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, $\lambda$ = 210 nm, retention time: 6.25 min (major), 7.45 min (minor). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.31 – 7.22 (m, 2H), 7.21 – 7.15 (m, 3H), 4.87 (s, 1H), 4.32 (d, $J$ = 7.6 Hz, 1H), 3.85 (d, $J$ = 12.1 Hz, 1H), 3.71 – 3.41 (m, 8H), 2.87 – 2.74 (m, 4H), 2.33 – 2.22 (m, 1H), 1.22 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 159.67, 150.02, 138.31, 135.29, 128.68, 128.46, 127.22, 66.91, 62.23, 61.48, 56.59, 51.89, 46.86, 45.08, 31.33, 29.66. ESI-HRMS: calcd for C$_{21}$H$_{30}$N$_{2}$NaO$_{4}$ $^{+}$ ([M+Na$^+$]) 397.2098, found 397.2096.

| Retention Time | Area     | % Area | Height |
|----------------|----------|--------|--------|
| 1              | 11.766   | 93.44  | 251654 |
| 2              | 15.026   | 6.56   | 9809   |

Dimethyl

2-(2-((3,3-dimethyl-1-morpholino-1-oxobutan-2-yl)amino)-2-oxo-1-phenylethyl)malonate 6

(C$_{23}$H$_{32}$N$_{2}$O$_{7}$) white solid; 99% yield, 1.8:1 d.r., 99% ee. (major), 97% ee. (minor); HPLC DAICEL CHIRALCEL IB,

| Retention Time | Area     | % Area | Height |
|----------------|----------|--------|--------|
| 1              | 6.322    | 48.82  | 84354  |
| 2              | 7.385    | 51.18  | 70266  |

| Retention Time | Area     | % Area | Height |
|----------------|----------|--------|--------|
| 1              | 6.247    | 97.43  | 1806916|
| 2              | 7.446    | 2.57   | 30209  |
n-hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, λ = 210 nm, retention time: t₁ = 6.89 min, t₂ = 8.17 min, t₃ = 10.19, t₄ = 11.82. ¹H NMR (400 MHz, THF) δ 7.62 (d, J = 9.7 Hz, 1H), 7.18 – 6.98 (m, 5H), 4.19 (dt, J = 25.2, 10.3 Hz, 3H), 3.54 (s, 3H), 3.50 – 3.41 (m, 4H), 3.22 (s, 5H), 3.14 – 2.98 (m, 2H), 0.89 (s, 9H). ¹³C NMR (100 MHz, THF) δ 170.40, 168.94, 167.96, 167.59, 136.92, 128.31, 128.02, 127.28, 55.04, 53.89, 51.70, 51.25, 46.40, 41.85, 35.40, 26.04.

ESI-HRMS: calcd for C_{23}H_{23}N_{2}NaO_{7}⁺ ([M+Na⁺]) 471.2102, found 471.2105.

dimethyl 2-(2-oxo-1-phenyl-2-pivalamidoethyl)malonate 7

(C_{18}H_{23}NO_{6}) colorless oil; 51% yield, 98% ee. HPLC DAICEL CHIRALCEL IE, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, λ = 210 nm, retention time: 7.48 min (minor), 12.27 min (major). ¹H NMR (400 MHz, CDCl₃) δ 8.32 (s, 1H), 7.39 – 7.21 (m, 5H), 5.41 (d, J = 11.7 Hz, 1H), 4.32 (d, J = 11.7 Hz, 1H), 3.74 (s, 3H), 3.45 (s, 3H), 1.15 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ 176.29, 174.04, 168.47, 167.57, 133.86, 129.16, 128.65, 128.17, 55.59, 52.91, 52.46, 50.63, 40.18, 30.73. ESI-HRMS: calcd for C_{18}H_{23}KNO_{6}⁺ ([M+K⁺]) 388.1157, found 388.1163.
methyl (R)-4-oxo-3-phenyl-4-pivalamidobutanoate 8

(C_{16}H_{21}NO_4) yellow solid; 47% yield, 0% ee. HPLC DAICEL CHIRALCEL IB, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, λ = 210 nm, retention time: 6.26 min (minor), 7.22 min (major). ¹H NMR (400 MHz, CDCl₃) δ 8.22 (s, 1H), 7.37 – 7.23 (m, 5H), 5.11 (dd, J = 10.4, 4.8 Hz, 1H), 3.66 (s, 3H), 3.29 (dd, J = 17.2, 10.4 Hz, 1H), 2.63 (dd, J = 17.2, 4.8 Hz, 1H), 1.13 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ 176.29, 174.96, 172.20, 137.24, 128.83, 128.40, 127.67, 51.85, 47.43, 40.17, 38.09, 26.82. ESI-HRMS: calcd for C_{16}H_{21}NNaO_4⁺ ([M+Na⁺]) 314.1363, found 314.1373.

methyl 3-(5-morpholino-4-phenyloxazol-2-yl)-3-phenylpropanoate 9

(C_{23}H_{24}N_2O_4) yellow solid; 99% yield, 95% ee. HPLC DAICEL
CHIRALCEL ID, n-hexane/2-propanol = 95/5, flow rate = 1.0 mL/min, λ = 254 nm, retention time: 11.68 min (minor), 13.25 min (major). ¹H NMR (400 MHz, CDCl₃) δ 7.94 (d, J = 8.1 Hz, 2H), 7.37 (t, J = 7.7 Hz, 2H), 7.29 (dd, J = 3.9 Hz, 4H), 7.26 – 7.17 (m, 2H), 4.60 (dd, J = 8.4, 7.0 Hz, 1H), 3.84 – 3.70 (m, 4H), 3.39 (dd, J = 16.4, 8.6 Hz, 1H), 3.08 – 2.98 (m, 4H), 2.94 (dd, J = 16.4, 6.8 Hz, 1H). ¹³C NMR (100 MHz, CDCl₃) δ 170.67, 157.74, 149.95, 138.33, 130.95, 127.73, 126.77, 126.35, 125.79, 124.87, 122.79, 65.81, 50.76, 49.27, 40.50, 37.99. ESI-HRMS: calcd for C₂₃H₂₄N₂NaO₄⁺ ([M+Na⁺]) 415.1628, found 415.1630.

methyl (R)-4-benzamido-4-oxo-3-phenylbutanoate 10

(C₁₈H₁₇NO₄) yellow oil; 70% yield, 94% ee. HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 70/30, flow rate = 1.0 mL/min, λ = 210 nm, retention time: 14.15 min (major), 17.94 min (minor). ¹H NMR (400 MHz, CDCl₃) δ 9.19 (s, 1H), 7.82 – 7.71 (m, 2H), 7.54 (t, J = 7.4 Hz, 1H), 7.41 (dd, J = 9.4, 7.6 Hz, 4H), 7.35 – 7.24 (m, 3H), 5.25 (dd, J = 10.6, 4.6 Hz, 1H), 3.64 (s, 3H), 3.34 (dd, J = 17.2, 10.7 Hz, 1H), 2.68 (dd, J = 17.2, 4.6 Hz, 1H). ¹³C NMR (100 MHz, CDCl₃) δ 175.28, 172.39, 165.36, 137.04, 133.16, 132.72, 128.98, 128.79, 128.46, 127.85, 127.87, 127.45, 51.97, 47.78, 38.25.
3-(5-morpholino-4-phenyloxazol-2-yl)-3-phenylpropan-1-ol 11

(C$_{22}$H$_{24}$N$_2$O$_3$) yellow oil; 47% yiled, 94% ee. HPLC DAICEL CHIRALCEL ID, n-hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $\lambda$ = 210 nm, retention time: 6.62 min (minor), 7.85 min (major). $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.91 (d, $J$ = 7.5 Hz, 2H), 7.42 – 7.21 (m, 8H), 4.31 (dd, $J$ = 8.3, 6.2 Hz, 1H), 3.91 – 3.76 (m, 4H), 3.75 – 3.60 (m, 2H), 3.50 (s, 1H), 3.12 – 2.96 (m, 4H), 2.54 – 2.37 (m, 1H), 2.26 (dd, $J$ = 13.5, 11.2, 6.5 Hz, 1H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 160.26, 151.04, 140.14, 131.64, 128.76, 128.51, 127.87, 127.16, 127.03, 125.93, 123.41, 66.90, 60.19, 50.32, 43.31, 37.37. ESI-HRMS: calcd for C$_{22}$H$_{24}$N$_2$NaO$_3$ $^+$ ([M+Na$^+$]) 387.1679, found 387.1678.

4-(tert-butyl)-5-(piperidin-1-yl)oxazole 7

To a stirred solution of the isocyanoacetamide 2e in DCM was added Sc(OTf)$_3$ (10 mol%). Upon reaction completion, water was
added and the mixture was extracted with DCM. The combined organic layers were dried upon Na$_2$SO$_4$, concentrated in vacuo. The crude material was then purified by Flash Chromatography (SiO$_2$, petroleum ether /AcOEt: 5/1) to give the desired oxazole 7 as a white powder.

$\text{(C}_{12}\text{H}_{18}\text{N}_2\text{O})$ $^1$H NMR (400 MHz, CDCl$_3$) $\delta$ 7.51 (s, 1H), 3.77 – 3.64 (m, 4H), 2.98 – 2.83 (m, 4H), 1.24 (s, 9H). $^{13}$C NMR (100 MHz, CDCl$_3$) $\delta$ 149.03, 145.49, 134.42, 65.97, 50.88, 30.30, 28.64. SI-HRMS: calcd for C$_{12}$H$_{18}$N$_2$NaO$_2$ $^+$ ([M+Na$^+$]) 233.1260, found 233.1273.

8. References
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9. Copies of NMR spectra
**Chemical Structures and Spectra**

1. **Structural Formula**
   - Compound 10
   - Molecular Formula: MeO₂C₄H₉N

2. **NMR Spectra**
   - **1H NMR** (ppm)
     - 10.0 (br s, 1 H)
     - 7.51 (d, J = 8.0 Hz, 2 H)
     - 7.39 (d, J = 8.0 Hz, 2 H)
     - 4.32 (t, J = 6.0 Hz, 2 H)
     - 3.54 (s, 3 H)
     - 3.40 (s, 3 H)
     - 1.06 (t, J = 7.0 Hz, 3 H)

3. **13C NMR** (ppm)
   - 175.3 (s, C=O)
   - 172.3 (s, C=O)
   - 163.5 (s, C=O)
   - 129.8 (s, C)
   - 128.9 (s, C)
   - 38.2 (s, C)
   - 52.5 (s, C)
   - 26.4 (s, C)
Copy of CD spectra
