A General Method for the Preparation of 5-Trifluoromethylated Oxazoles from α-Amino Acids

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The reactions of *N*-acyl-*N*-benzyl-α-amino acids (1) or *N*-acylprolines (5) with trifluoroacetic anhydride in the presence of pyridine afford 5-trifluoromethyloxazoles (2 or 7) in good yields. The reaction could proceed through the transient formation of mesoionic 1,3-oxazolium-5-olates, followed by oxazolium salts.

Key words 5-trifluoromethyloxazole; 1,3-oxazolium-5-olate; α-amino acid; trifluoroacetic anhydride; trifluoroacetyl compound

Considerable efforts have been made to develop effective routes to trifluoromethyl- or perfluoroalkyl-substituted heterocycles, because the biological activities and physical properties are often dramatically changed by the introduction of fluorine-containing substituents into the molecules.[1] However, available methods for the introduction of a trifluoromethyl group at a specific position in a heteroaromatic compound in good yield are quite limited.[2] Hence, an effective method for the regioselective synthesis of trifluoromethylated heteroaromatic compounds is still required.

Among heteroaromatic systems, oxazoles not only occur in several natural products,[3] but also are important as synthetic intermediates leading to many other systems.[4] Various oxazoles have found applications as scintillators, fluorescent whitening agents, luminescent materials, and herbicides.[5] Further, trifluoromethyloxazoles are of interest due to their applications as surface modifiers of hydrophilic polymers, polymeric films for second-order non-linear optics, effective herbicides, body-membrane penetration enhancers, and intermediates for the synthesis of unnatural α-amino acids.[6] Several methods have recently been reported for the synthesis of such molecules.[7] However, for the synthesis of 5-trifluoromethyloxazole derivatives there are only two methods: i) thermal cyclization[8] of hydrazono-1,1,1-trifluoroalkan-2-ones, followed by dehydration of the resulting 5-hydroxy-5-trifluoromethyl-3-oxazolines, which suffers from poor generality and efficiency and ii) photolysis[9] of trifluoroacetyldiazoacetic esters in acetonitrile, which has only been applied in a few cases. These circumstances prompted us to seek a convenient synthesis of 5-trifluoromethyloxazoles.

In the course of our studies on the synthetic application of mesoionic 1,3-oxazolium-5-olates,[10] we have investigated in detail the reaction of secondary α-amino acids with trifluoroacetic anhydride (TFAA).[11] In these studies, we observed the formation of 5-trifluoromethyloxazoles by the reaction of *N*-acyl-*N*-alkyl-α-amino acids[11a] or *N*-acylprolines[11b] with TFAA under the Dakin–West reaction conditions.

We now present a full account of this reaction and the new synthesis of 5-trifluoromethyl-substituted oxazole derivatives in good to excellent yields.

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Results and Discussion

Synthesis of 5-Trifluoromethyloxazoles from *N*-acyl-*N*-alkyl-α-amino Acids Table 1 shows the results when several *N*-alkyl-*N*-benzoylphenylalanine derivatives (**1a**—**d**) were allowed to react with TFAA in the presence of pyridine (runs 1—4). Among the four *N*-alkyl groups examined (Me, Et, iso-Pr, and benzyl), use of the last one proved to give the best result. Thus, **1d** (1.5 mmol) was added to a stirred solution of TFAA (4.5 mmol) and pyridine (9 mmol) in dry benzene (6 ml) at 0 °C and the mixture was stirred at 25 °C for 3 h, then refluxed for 5 h. After usual work-up, the 5-trifluoromethyloxazole derivative (**2a**) was isolated in 88% yield. The structure of **2a** is supported by spectral and analytical data. The assignments of the carbon signals in **2a** were performed on the basis of the long-range ^{13}C–^{19}F coupling. Thus, J_{C-F} is easily measured up to three bonds in ^{1}H-decoupled ^{13}C-NMR spectra δ: 119.94 (CF_3, $^{1}J_{C-F}=266.9$ Hz), 133.99 (C-5, $^{2}J_{C-F}=42.4$ Hz), and 140.61 (C-4, $^{3}J_{C-F}=2.5$ Hz). Mechanistically, if the benzyl group is easily removable in an intermediate step, the reaction could proceed efficiently. Indeed, benzyl alcohol was also isolated in 41% yield in the reaction of **1d**. The mechanism is discussed later. Next, several *N*-acyl-*N*-benzyl-α-amino acids (**1d**—**j**) were subjected to the reaction and the results are collected in Table 1. *N*-Acyl derivatives, containing benzoyl, cinnamoyl, thenoyl, or pivaroyl groups, worked well (Table 1, runs 6—11). On the other hand, *N*-acetyl- and *N*-isobutyryl-*N*-benzylphenylalanines (**1k**), bearing α-hydrogens, afforded no oxazole derivatives. In the reaction of **1k**, we obtained the trifluoromethylketones (**3**) in 82% yield (Table 1, run 14). *N*-Acetyl derivatives afforded trifluoromethylated 1,4-oxazine derivatives in moderate yields under more vigorous conditions.[11d] These results clearly indicate that the reaction is makedly influenced by the nature of both alkyl and acyl substituents on the nitrogen of α-amino acids. Thus, if *N*-substituents of amino acids are selected properly, a variety of α-amino acids, including phenylglycine, phenylalanine, alanine, and isoleucine, can be subjected to the reaction to give the 5-trifluoromethyloxazoles (**2**) in good yields (Table 1).

When pentafluoropropionic or heptafluorobutyric anhydride was used instead of TFAA, 5-pentafluoroethyl- (**4a**) or 5-heptafluoro-*n*-propyloxazole (**4b**) was obtained

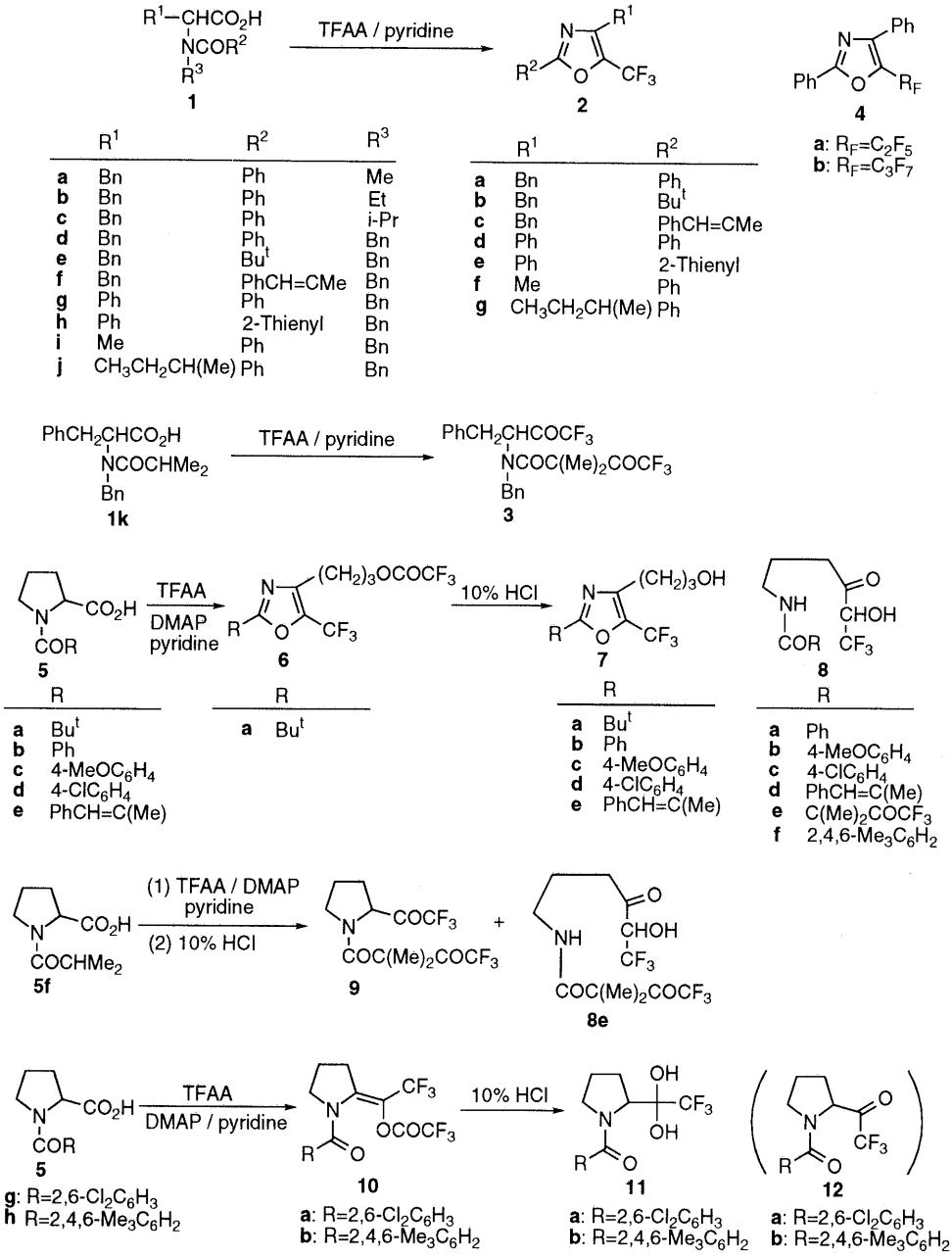

Chart 1

Table 1. Reactions of *N*-Acyl-*N*-alkyl-α-amino Acids (**1**) with TFAA

Run	1	Product (yield, %)
1	**1a**	**2a** (13)
2	**1b**	**2a** (16)
3	**1c**	**2a** (20)
4	**1d**	**2a** (88)
5[a]	**1d**	**2a** (81)
6	**1e**	**2b** (83)
7	**1f**	**2c** (61)
8	**1g**	**2d** (92)
9	**1h**	**2e** (93)
10	**1i**	**2f** (46)
11	**1j**	**2g** (51)
12[b]	**1g**	**4a** (92)
13[c]	**1g**	**4b** (98)
14	**1k**	**3** (82)

a) DMAP (0.1 mol eq) was added to the reaction. *b*) Pentafluoropropionic anhydride was used, instead of TFAA. *c*) Heptafluorobutyric anhydride was used, instead of TFAA.

in high yield, respectively (Table 1, runs 12 and 13).

Syntheses of 5-Trifluoromethyloxazoles from *N*-Acylprolines The reaction of *N*-acylprolines (**5a—e**) with TFAA in the presence of pyridine also results in the formation of 5-trifluoromethyloxazoles (**7a—e**) in good yields, after the acid hydrolysis of the resulting trifluoroacetates (**6**). In the case of *N*-pivaloylproline (**5a**), the trifluoroacetate (**6a**) was isolated in a pure form by column chromatography, before hydrolysis. Other trifluoroacetates are unstable due to their susceptibility to hydrolysis. Reaction variables were examined in the reaction of *N*-pivaloylproline (**5a**) with TFAA. As shown in Table 2, no reaction takes place in the absence of a base (runs 1 and 2). In the *N*-acylproline series, combined use of pyridine and a catalytic amount of 4-dimethylaminopyridine (DMAP) gave a high yield of the product (Table 2, runs 2 and 3). The reaction temperature also has a profound effect on the success of this reaction (Table 2, runs 3—5). *N*-Acyl

derivatives, containing pivaloyl, benzoyl, or cinnamoyl groups, were easily converted to the oxazoles (**7**) in good yields (Table 3, runs 1—5). Only *N*-isobutyrylproline (**5f**) gave **9** (41%) and **8e** (29%) (Table 3, run 6). On the other hand, *N*-acetylproline did not afford the corresponding oxazole derivative. The structure of **7e** was determined by X-ray crystallography.[12]

In the case of *N*-(2,6-dichloro)- (**5g**) and *N*-(2,4,6-trimethylbenzoyl)prolines (**5h**), we did not obtain the oxazole derivatives, but enol trifluoroacetates (**10**), which were each isolated as a single isomer in good yield. Hydrolysis of **10** gave trifluoromethyl ketone hydrate (**11**) in high yields (Table 3, runs 7 and 8). The structure of **11a** was determined by X-ray crystallography.[12] The ^{1}H-NMR spectrum of **11a** in $CDCl_3$ showed it to be a mixture of the hydrate (**11a**) and the trifluoromethyl ketone (**12a**) in about 3:1 ratio. It is known that the trifluoromethyl ketones readily give the corresponding hydrates.[13]

Table 2. Reactions of *N*-Pivaloylproline (**5a**) with TFAA

Run	Base (mol eq)	Conditions	Yield of **7a** (%)
1	None	r.t., 3 h; reflux, 5 h	0
2	Pyridine (6)	r.t., 3 h; reflux, 5 h	67
3	Pyridine (6)/DMAP (0.1)	r.t., 3 h; reflux, 5 h	87
4	Pyridine (6)/DMAP (0.1)	r.t., 24 h	0
5	Pyridine (6)/DMAP (0.1)	r.t., 3 h; 50 °C, 5 h	25

r.t. = room temperature.

Table 3. Reactions of *N*-Acylproline (**5**) with TFAA

Run	**5**	Product (yield, %)
1	**5a**	**7a** (87)
2	**5b**	**7b** (61), **8a** (15)
3	**5c**	**7c** (81), **8b** (6)
4	**5d**	**7d** (46), **8c** (25)
5	**5e**	**7e** (65), **8d** (10)
6	**5f**	**9** (41), **8e** (29)
7	**5g**	**11a** (93)
8	**5h**	**11b** (72), **8f** (19)

Several chemical transformations of the propyl alcohol moiety of **7** are possible (Chart 2). Thus, methylation of the alcohol (**7a**) with MeI in the presence of NaH afforded a good yield of the methyl ether (**13**). Oxidation of the alcohol (**7c**) to the corresponding aldehyde (**14**) was achieved in 80% yield by using PCC in CH_2Cl_2. The alcohol (**7b**) was converted to the formate (**15**) by using ammonium formate under reflux in xylene. The reaction of the alcohol (**7c**) and butyl vinyl ether under reflux in benzene afforded **16** in 94% yield.

Mechanistic Consideration A plausible mechanism of the formation of **2**, **3**, **7**, and **8** is suggested in Charts 3 and 4. The reaction involves a mesoionic 1,3-oxazolium-5-olate formed through the cyclodehydration of **1** by TFAA. The intermediate (**17**) undergoes trifluoroacetyla-

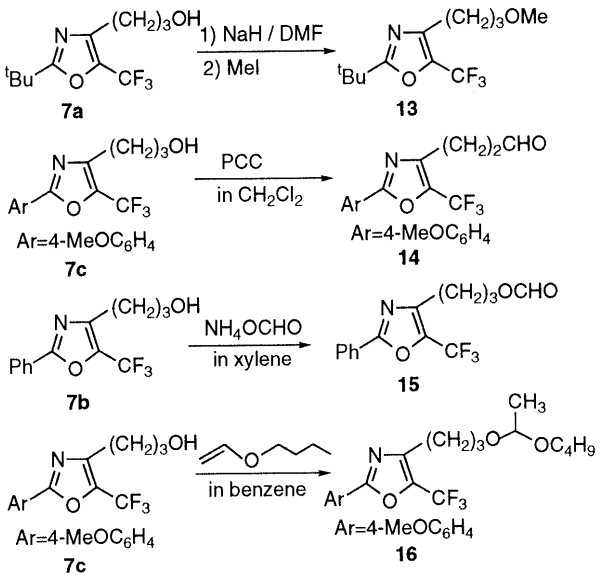

Chart 2

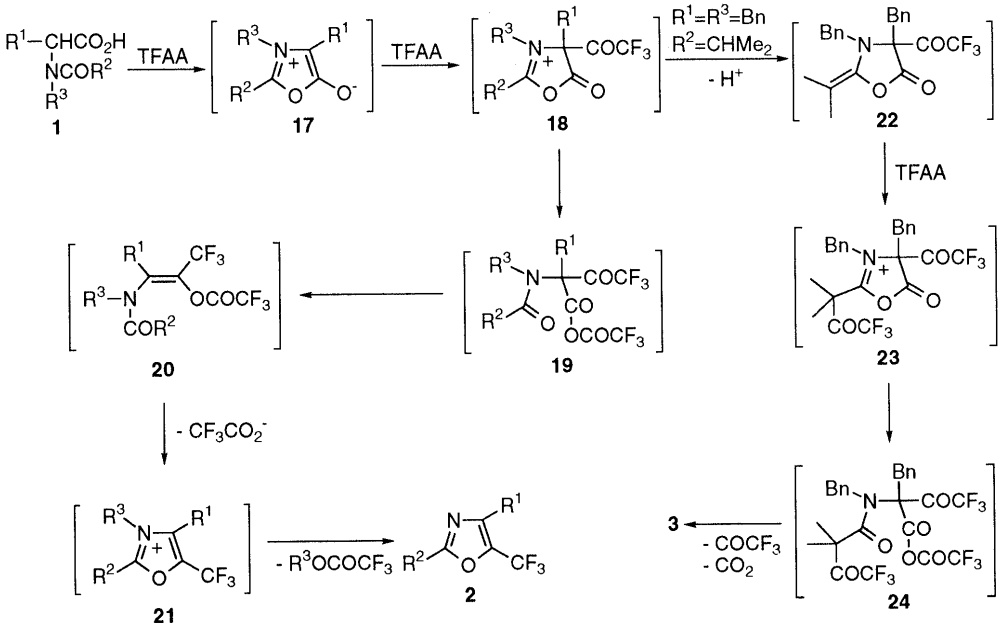

Chart 3

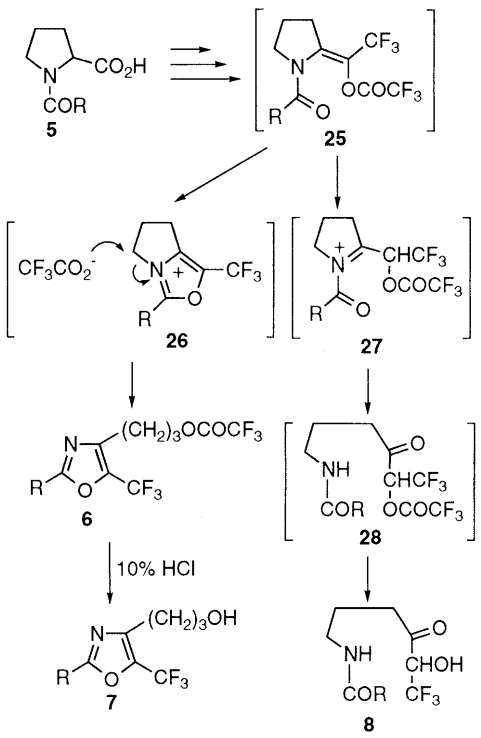

Chart 4

tion followed by decarboxylation to give the enol trifluoroacetate (**20**). Cyclization of **20** leads to the oxazolium salt (**21**). If the R^3 group of **21** is easily removable, the reaction could proceed efficiently. This is the reason why *N*-benzyl derivatives are the best substrates for this transformation. In the case of **1k**, the intermediate (**18**) (R = $CHMe_2$), bearing an α-hydrogen, isomerizes to **22**, which undergoes trifluoroacetylation. A similar type of trifluoroacetylation has been reported in the reaction of other vinyl ethers with TFFA in the presence of pyridine.[14] Finally, ring opening of **23** followed by decarboxylation of the resulting **24** leads to **3**. In the case of *N*-acylprolines (**5**), the key intermediate (**25**) was isolated in the reactions of **5g** and **5h**: a similar mechanism has been postulated in the Dakin–West reaction.[15] The cleavage of the N–C bond of the intermediate (**26**) readily occurs upon attack of the trifluoroacetate anion because of the hindered 5-5 bicyclic system. As described in Chart 4, the formation of **8** could be through hydrolysis of **25**.

In summary, a convenient method for the synthesis of 5-trifluoromethyl-substituted oxazoles direct from α-amino acids is described. The substitution pattern of the oxazole ring can be altered simply by choosing the appropriate starting material. Furthermore, the simplicity of the method and the ready availability of the starting material make this a practical approach. In addition, 5-perfluoroalkyl-substituted oxazoles could be prepared conveniently by employing perfluorocarboxylic anhydride.

Experimental

General Methods All melting points were determined with a Yanagimoto hot-stage melting point apparatus and are uncorrected. ^{1}H-NMR spectra were measured on either a JEOL JNM-PMX60SI, a JEOL JNM-FX270, or a JEOL JNM-GSX500 spectrometer with tetramethylsilane (Me_4Si) as an internal reference and $CDCl_3$ as the solvent, unless otherwise noted. ^{13}C-NMR spectra were obtained on a JEOL JNM-FX270 or a JEOL JNM-GSX500 spectrometer (at 67.8 or 126 MHz). Both ^{1}H- and ^{13}C-NMR spectral data are reported in parts per million (δ) relative to Me_4Si. Infrared (IR) spectra were recorded on a JASCO IR810 spectrometer. Low- and high-resolution mass spectra (MS) were obtained with a JEOL JMS-DX300 spectrometer with a direct inlet system at 70 eV. Combustion analyses were carried out in the microanalytical laboratory of this university. In the preparation of *N*-acyl-*N*-alkyl-α-amino acids (**1**) and *N*-acylprolines (**5**), L-Phe, L-Ala, L-Ileu, DL-phenylglycine, and L-Pro were used as the starting materials. Standard work-up means that the organic layers were finally dried over Na_2SO_4, filtered, and concentrated *in vacuo* below 45 °C using a rotary evaporator.

Materials The following compounds were prepared by reported procedures: *N*-Benzoyl-*N*-methylphenylalanine (**1a**): mp 137—138 °C (mp[16] 137—138 °C). *N*-Pivaloylproline (**5a**): mp 131—132 °C (mp[16] 128.3—129.6 °C). *N*-Benzoylproline (**5b**): mp 155—157 °C (mp[16] 153.9—154.3 °C). *N*-(4-Methoxybenzoyl)proline (**5c**): mp 105—108 °C (mp[17] 106—110 °C). *N*-(4-Chlorobenzoyl)proline (**5d**): mp 122—125 °C (mp[17] 124—126 °C). *N*-Isobutyrylproline (**5f**): mp 123—124 °C (mp[18] 123—124.1 °C).

Preparation of *N*-Acyl-*N*-benzyl-α-amino Acid Esters (29a—h) Esters (**29a—h**) were prepared in good yields by acylation of *N*-benzylamino acid esters, which were prepared by the reported method.[19]

Methyl *N*-Benzoyl-*N*-benzylphenylalaninate (**29a**): Yield 76% (after column chromatography) (EtOAc : hexane = 1 : 1), oil. High-resolution MS: Calcd for $C_{24}H_{23}NO_3$: 373.1678. Found: 373.1652. ^{1}H-NMR (500 MHz) δ: 3.24—3.56 + 3.64—3.77 (3H, br), 3.70 (3H, br s), 4.13 + 4.44 (2H, d, *J* = 15.8 Hz), 7.24—7.36 (15H, m). IR (neat) cm^{-1}: 1740, 1640. MS *m/z*: 373 (M^+, 3.2), 105 (100).

Methyl *N*-Benzyl-*N*-pivaloylphenylalaninate (**29b**): Yield 85% (after column chromatography) (EtOAc : hexane = 1 : 2), oil. High-resolution MS: Calcd for $C_{22}H_{27}NO_3$: 353.1991. Found: 353.1989. ^{1}H-NMR (500 MHz) δ: 1.32 + 1.68 (9H, s), 3.24—3.40 (1H, m), 3.53—3.56 + 3.63—3.67 (2H, m), 3.65 (3H, s), 3.81 + 4.73 (2H, d, *J* = 15.9 Hz), 7.05—7.31 (10H, m). IR (neat) cm^{-1}: 1735, 1630. MS *m/z*: 353 (M^+, 2.2), 91 (100).

(*E*)-Methyl *N*-Benzyl-*N*-(2-methyl-3-phenylpropenyl)phenylalaninate (**29c**): Yield 87% (after column chromatography) (EtOAc : hexane = 1 : 2), oil. High-resolution MS: Calcd for $C_{27}H_{27}NO_3$: 413.1991. Found: 413.1971. ^{1}H-NMR (500 MHz) δ: 1.93 (3H, br s), 3.41 + 3.71 (3H, br s), 3.65—3.77 (2H, br), 3.65—3.77 + 4.57 (2H, d, *J* = 15.6 Hz), 3.82—3.85 + 4.28—4.40 (1H, br), 6.36 (1H, br s), 7.16—7.37 (15H, m). IR (neat) cm^{-1}: 1740, 1630. MS *m/z*: 413 (M^+, 14.1), 145 (100).

Methyl *N*-Benzoyl-*N*-benzylphenylglycinate (**29d**): Yield 86% (after column chromatography) (EtOAc : hexane = 1 : 1), oil. High-resolution MS: Calcd for $C_{23}H_{21}NO_3$: 359.1522. Found: 359.1511. ^{1}H-NMR (270 MHz) δ: 3.75 (3H, s), 3.75 (1H, d, *J* = 16.3 Hz), 4.77 (1H, d, *J* = 16.3 Hz), 5.53 (1H, br s), 6.86—6.99 (2H, m), 7.16—7.37 (11H, m), 7.49—7.52 (2H, m). IR (neat) cm^{-1}: 1740, 1640. MS *m/z*: 359 (M^+, 0.4), 105 (100).

Methyl *N*-Benzyl-*N*-thenoylphenylglycinate (**29e**): Yield 91% (after column chromatography) (EtOAc : hexane = 1 : 1), mp 113—114 °C (CH_2Cl_2–hexane). ^{1}H-NMR (500 MHz) δ: 3.76 (3H, s), 4.59 (1H, d, *J* = 17.4 Hz), 5.06 (1H, d, *J* = 17.4 Hz), 5.61 (1H, br s), 6.94 (1H, dd, *J* = 4.0, 5.1 Hz), 7.14—7.15 (2H, m), 7.22—7.28 (8H, m), 7.33 (1H, dd, *J* = 1.0, 4.0 Hz), 7.46 (1H, dd, *J* = 1.0, 5.1 Hz). IR (nujol) cm^{-1}: 1745, 1615. MS *m/z*: 365 (M^+, 1.5), 111 (100). *Anal.* Calcd for $C_{21}H_{19}NO_3S$: C, 69.02; H, 5.24; N, 3.83. Found: C, 69.23; H, 5.36; N, 3.42.

Benzyl *N*-Benzoyl-*N*-benzylalaninate (**29f**): Yield 87% (after column chromatography) (EtOAc : hexane = 1 : 1), oil. High-resolution MS: Calcd for $C_{24}H_{23}NO_3$: 373.1678. Found: 373.1685. ^{1}H-NMR (500 MHz) δ: 1.30—1.45 + 1.45—1.55 (3H, br), 3.75 + 4.21 (1H, br s), 4.52 (1H, d, *J* = 15.0 Hz), 4.60 (1H, d, *J* = 15.0 Hz), 5.15—5.25 (2H, br), 7.28—7.41 (10H, m). IR (neat) cm^{-1}: 1740, 1640. MS *m/z*: 373 (M^+, 2.7), 105 (100).

Methyl *N*-Benzoyl-*N*-benzylisoleucinate (**29g**): Yield 88% (after column chromatography) (EtOAc : hexane = 1 : 3), oil. High-resolution MS: Calcd for $C_{21}H_{25}NO_3$: 339.1834. Found: 339.1849. ^{1}H-NMR (500 MHz) δ: 0.73—1.01 (6H, m), 1.47—1.55 (1H, m), 2.05—2.21 (2H, m), 3.34 + 3.42 (3H, s), 4.10—4.17 (1H, m), 4.20—4.60 + 5.11—5.30 (2H, m), 7.21—7.55 (10H, m). IR (neat) cm^{-1}: 1740, 1640. MS *m/z*: 339 (M^+, 3.5), 105 (100).

Methyl *N*-Benzyl-*N*-isobutyrylphenylalaninate (**29h**): Yield 85% (after column chromatography) (EtOAc : hexane = 1 : 2), oil. High-resolution MS: Calcd for $C_{21}H_{25}NO_3$: 339.1835. Found: 339.1838. ^{1}H-NMR (500 MHz) δ: 1.02 (3H, d, *J* = 6.8 Hz), 1.13 (3H, d, *J* = 6.8 Hz), 2.63—2.69

(1H, m), 3.21—3.37 (2H, m), 3.62 (3H, s), 3.84+4.46 (2H, d, J=17.1 Hz), 4.38—4.42 (1H, m), 7.06—7.19 (4H, m), 7.22—7.28 (6H, m). IR (neat) cm^{-1}: 1740, 1650. MS m/z: 339 (M^+, 4.8), 91 (100).

Ethyl *N*-Benzyloxycarbonyl-*N*-ethylphenylalaninate (29i) A solution of ethyl *N*-benzyloxycarbonylphenylalaninate (4.26 g, 13.0 mmol) in DMF (5 ml) was added to a suspension of NaH (0.55 g, 60% dispersion in mineral oil, 13.6 mmol) in DMF (10 ml) at 0 °C for 15 min. The mixture was stirred at 25 °C for 0.5 h, then a solution of ethyl iodide (1.2 ml, 14.3 mmol) in *N*,*N*-dimethylformamide (DMF, 2 ml) was added at 0 °C for 15 min. The resulting mixture was stirred at 25 °C for 6 h and then diluted with Et_2O (80 ml) and H_2O (60 ml). After standard work-up, the residue was chromatographed on a column of silica gel with AcOEt : hexane (1 : 2) to give **29i** (3.87 g, 84%) as an oil. High-resolution MS: Calcd for $C_{21}H_{25}NO_4$: 355.1784. Found: 355.1766. ^{1}H-NMR (500 MHz) δ: 0.90—0.96 (3H, m), 1.13—1.23+1.25—1.58 (3H, m), 2.82—2.85 (1H, m), 3.10—3.36 (3H, m), 3.96—4.34 (3H, m), 5.09—5.16 (2H, m), 7.08—7.37 (10H, m). IR (neat) cm^{-1}: 1740, 1700. MS m/z: 355 (M^+, 0.3), 91 (100).

Ethyl *N*-Benzoyl-*N*-ethylphenylalaninate (29j) A mixture of **29i** (3.56 g, 10.0 mmol) and 10% Pd–C (300 mg) in AcOEt (30 ml) was stirred under an H_2 atmosphere at 25 °C for 1 h. The mixture was filtered and the filtrate was concentrated *in vacuo* to give ethyl *N*-ethylphenylalaninate. The obtained ester was utilized in the Schotten–Baumann reaction without further purification. Yield 2.96 g (91%) (after column chromatography) (EtOAc : hexane = 1 : 2), oil. High-resolution MS: Calcd for $C_{20}H_{23}NO_3$: 325.1678. Found: 325.1667. ^{1}H-NMR (500 MHz) δ: 1.21—1.26 (6H, m), 3.07—3.15 (2H, m), 4.14—4.18 (2H, m), 4.62—4.66 (1H, m), 5.07—5.13 (2H, m), 5.21—5.23 (1H, m), 7.11 (2H, d, J=8.3 Hz), 7.23—7.28 (4H, m), 7.30—7.37 (4H, m). IR (neat) cm^{-1}: 1735, 1630. MS m/z: 325 (M^+, 3.4), 105 (100).

Methyl *N*-Benzoyl-*N*-isopropylphenylalaninate (29k) Acetone (3.2 ml, 44 mmol) was added to a stirred solution of phenylalanine (6.6 g, 40 mmol) and $NaBH_3CN$ (1.76 g, 28 mmol) in MeOH (50 ml) at 25 °C. The mixture was stirred at 25 °C for 15 h and the precipitated crystals were collected by filtration. $SOCl_2$ (3 ml, 41.1 mmol) was added to a suspension of the obtained *N*-isopropylphenylalanine in MeOH (50 ml) and the mixture was concentrated *in vacuo* to give methyl *N*-isopropylphenylalaninate, which was utilized in the Schotten–Baumann reaction without further purification. Yield 5.1 g (39%) (after column chromatography) (EtOAc : hexane = 1 : 1), oil. High-resolution MS: Calcd for $C_{20}H_{23}NO_3$: 325.1678. Found: 325.1678. ^{1}H-NMR (270 MHz) δ: 0.38+1.04+1.27 (6H, d, J=6.4 Hz), 3.19—3.34 (1H, m), 3.53—3.61+3.82—3.90 (2H, m), 3.77+3.81 (3H, s), 5.06—5.13 (1H, m), 7.12—7.52 (8H, m), 7.73 (1H, m, J=6.9 Hz), 8.11 (1H, d, J=6.9 Hz). IR (neat) cm^{-1}: 1740, 1630. MS m/z: 325 (M^+, 1.3), 105 (100).

Hydrolysis of *N*-Acyl-*N*-benzyl-α-amino Acid Esters (29) A solution of an ester (**29**) (10 mmol) and 2 N NaOH (7.5 ml, 15 mmol) in dioxane (7.5 ml) was stirred at 65 °C for 2 h. The reaction mixture was diluted with Et_2O (50 ml) and H_2O (50 ml). The aqueous layer was acidified with concentrated HCl and extracted with AcOEt (70 ml × 2) followed by standard work-up.

N-Benzoyl-*N*-ethylphenylalanine (**1b**): Yield 93%, mp 162—164 °C (AcOEt–hexane). ^{1}H-NMR (500 MHz) δ: 0.82 (3H, t, J=7.0 Hz), 2.77—2.81 (1H, m), 3.18—3.29 (1H, m), 3.40—3.45 (1H, m), 3.64—3.71 (1H, m), 4.12—4.16 (1H, m), 7.19—7.44 (10H, m). IR (nujol) cm^{-1}: 3200 (br), 1730, 1620. MS m/z: 297 (M^+, 2.3), 105 (100). *Anal.* Calcd for $C_{18}H_{19}NO_3$: C, 72.71; H, 6.44; N, 4.71. Found: C, 72.69; H, 6.46; N, 4.71.

N-Benzoyl-*N*-isopropylphenylalanine (**1c**): Yield 91%, mp 207—210 °C (AcOEt–hexane). ^{1}H-NMR (500 MHz) δ: 0.49 (3H, d, J=6.7 Hz), 1.08 (3H, d, J=6.7 Hz), 3.26—3.41 (2H, m), 3.77—3.85 (1H, m), 4.05—4.08 (1H, m), 7.21—7.53 (10H, m). IR (nujol) cm^{-1}: 3200 (br), 1735, 1620. MS m/z: 311 (M^+, 1.0), 105 (100). *Anal.* Calcd for $C_{19}H_{21}NO_3$: C, 73.29; H, 6.80; N, 4.50. Found: C, 72.93; H, 6.85; N, 4.37.

N-Benzoyl-*N*-benzylphenylalanine (**1d**): Yield 88%, mp 114—116 °C (AcOEt–hexane). ^{1}H-NMR (500 MHz) δ: 3.38—3.43 (1H, br), 3.59—3.70 (2H, br), 4.08—4.16+4.50 (2H, d, J=15.8 Hz), 7.10—7.38 (15H, m). IR (nujol) cm^{-1}: 3150 (br), 1745, 1610. MS m/z: 359 (M^+, 5.4), 105 (100). *Anal.* Calcd for $C_{23}H_{21}NO_3 \cdot 1/2H_2O$: C, 75.27; H, 6.02; N, 3.81. Found: C, 75.36; H, 6.21; N, 3.54.

N-Benzyl-*N*-pivaloylphenylalanine (**1e**): Yield 91%, mp 146—148 °C (Et_2O–hexane). ^{1}H-NMR (500 MHz) δ: 1.31 (9H, s), 3.30—3.41 (2H, m), 3.52+4.80 (2H, d, J=15.8 Hz), 3.68—3.71 (1H, m), 7.10—7.13 (4H, m), 7.29—7.31 (6H, m). IR (nujol) cm^{-1}: 3050 (br), 1740, 1580. MS m/z: 339 (M^+, 1.3), 91 (100). *Anal.* Calcd for $C_{21}H_{25}NO_3$: C, 74.31; H, 7.42; N, 4.13. Found: C, 74.16; H, 7.55; N, 4.05.

(*E*)-*N*-Benzyl-*N*-(2-methyl-3-phenylpropenyl)phenylalanine (**1f**): Yield 96%, oil. High-resolution MS: Calcd for $C_{26}H_{25}NO_3$: 399.1834. Found: 399.1834. ^{1}H-NMR (500 MHz) δ: 1.19 (3H, br s), 3.40 (1H, br s), 3.53—3.68+4.11—4.20 (2H, br), 3.71—3.77+4.67—4.71 (2H, br), 6.39 (1H, br s), 7.11—7.42 (10H, m). IR (neat) cm^{-1}: 3000 (br), 1730, 1640. MS m/z: 399 (M^+, 19.2), 145 (100).

N-Benzoyl-*N*-benzylphenylglycine (**1g**): Yield 90%, mp 159—161 °C (AcOEt–hexane). ^{1}H-NMR (500 MHz) δ: 4.35 (1H, d, J=7.4 Hz), 4.82 (1H, d, J=7.4 Hz), 5.36 (1H, br s), 7.06 (2H, d, J=8.3 Hz), 7.22—7.41 (11H, m), 7.52—7.54 (2H, m). IR (nujol) cm^{-1}: 3050 (br), 1720, 1700. MS m/z: 345 (M^+, 0.4), 105 (100). *Anal.* Calcd for $C_{22}H_{19}NO_3$: C, 76.50; H, 5.54; N, 4.06. Found: C, 76.36; H, 5.77; N, 3.92.

N-Benzyl-*N*-thenoylphenylglycine (**1h**): Yield 91%, mp 159—162 °C (AcOEt–hexane). ^{1}H-NMR (500 MHz) δ: 4.57 (1H, d, J=7.4 Hz), 5.13 (1H, d, J=7.4 Hz), 5.42 (1H, br), 6.96 (1H, dd, J=3.8, 4.9 Hz), 7.21—7.34 (10H, m), 7.37 (1H, dd, J=1.0, 3.8 Hz), 7.48 (1H, dd, J=1.0, 4.9 Hz). IR (nujol) cm^{-1}: 3050 (br), 1760. MS m/z: 351 (M^+, 0.4), 111 (100). *Anal.* Calcd for $C_{20}H_{17}NO_3S$: C, 68.36; H, 4.88; N, 3.99. Found: C, 68.64; H, 5.00; N, 3.96.

N-Benzoyl-*N*-benzylalanine (**1i**): Yield 86%, oil. High-resolution MS: Calcd for $C_{17}H_{17}NO_3$: 283.1207. Found: 283.1202. ^{1}H-NMR (500 MHz) δ: 1.56 (3H, br s), 4.18 (1H, br s), 4.57—4.70 (2H, m), 7.28—7.61 (10H, m). IR (neat) cm^{-1}: 3000 (br), 1740, 1610. MS m/z: 283 (M^+, 3.8), 105 (100).

N-Benzoyl-*N*-benzylisoleucine (**1j**): Yield 85%, oil. High-resolution MS: Calcd for $C_{20}H_{23}NO_3$: 325.1678. Found: 325.1668. ^{1}H-NMR (500 MHz) δ: 0.68—1.08 (6H, m), 1.21—1.29 (1H, m), 1.51—1.75 (1H, m), 2.65—2.75 (1H, m), 3.48—3.66 (1H, m), 4.24—4.31+4.84—4.93 (2H, m), 7.10—7.60 (10H, m). IR (neat) cm^{-1}: 3000 (br), 1720, 1640. MS m/z: 325 (M^+, 2.4), 105 (100).

N-Benzyl-*N*-isobutyrylphenylalanine (**1k**): Yield 81%, mp 100—102 °C (hexane). ^{1}H-NMR (500 MHz) δ: 1.11 (3H, d, J=6.8 Hz), 1.16 (3H, d, J=6.8 Hz), 2.58—2.73 (2H, m), 3.31—3.41 (2H, m), 3.70+4.46 (2H, d, J=16.8 Hz), 4.08—4.12 (1H, m), 7.07—7.14 (4H, m), 7.19—7.29 (6H, m). IR (nujol) cm^{-1}: 3050 (br), 1745, 1605. MS m/z: 325 (M^+, 12.0), 91 (100). *Anal.* Calcd for $C_{20}H_{23}NO_3$: C, 73.82; H, 7.12; N, 4.30. Found: C, 73.84; H, 7.22; N, 4.34.

The following *N*-acylprolines were prepared in good yields by Schotten–Baumann reaction of proline and the appropriate acyl chloride.

(*E*)-*N*-(2-Methyl-3-phenylpropenoyl)proline (**5e**): Yield 81%, mp 114—115 °C (AcOEt–hexane). ^{1}H-NMR (270 MHz) δ: 1.92—2.25 (3H, m), 2.14 (3H, s), 2.34—2.42 (1H, m), 3.66—3.74 (2H, m), 4.64—4.69 (1H, m), 6.75 (1H, s), 7.30—7.45 (5H, m). IR (nujol) cm^{-1}: 2900 (br), 1740. MS m/z: 259 (M^+, 10.4), 145 (100). *Anal.* Calcd for $C_{15}H_{17}NO_3$: C, 69.48; H, 6.61; N, 5.40. Found: C, 69.21; H, 6.63; N, 5.47.

N-(2,6-Dichlorobenzoyl)proline (**5g**): Yield 66%, mp 152—154 °C (AcOEt–hexane). ^{1}H-NMR (270 MHz) δ: 1.91—2.27 (3H, m), 2.45—2.55 (1H, m), 3.23—3.41 (2H, m), 4.80—4.84 (1H, m), 5.80—6.50 (1H, br), 7.23—7.40 (3H, m). IR (nujol) cm^{-1}: 3120 (br), 1760, 1610. MS m/z: 287 (0.9)+289 (0.7)+291 (0.1) (M^+), 173 (100). *Anal.* Calcd for $C_{12}H_{11}Cl_2NO_3$: C, 50.02; H, 3.85; N, 4.86. Found: C, 49.88; H, 3.88; N, 4.74.

N-(2,4,6-Trimethylbenzoyl)proline (**5h**): Yield 92%, oil. High-resolution MS: Calcd for $C_{15}H_{19}NO_3$: 261.1365. Found: 261.1346. ^{1}H-NMR (60 MHz) δ: 1.83—2.47 (4H, m), 2.15 (3H, s), 2.25 (6H, s), 2.97—3.37 (2H, m), 4.52—4.86 (1H, m), 6.82 (2H, br). IR (neat) cm^{-1}: 3450 (br), 1730, 1640. MS m/z: 261 (M^+, 6.2), 147 (100).

General Procedure for the Reactions of *N*-Acyl-*N*-benzylamino Acids with TFAA *N*-Acyl-*N*-benzylamino acid (**1**) (1.5 mmol) was added to a stirred solution of TFAA (0.64 ml, 4.5 mmol) and pyridine (0.73 ml, 9 mmol) in dry benzene (6 ml) at 0 °C and the mixture was stirred at 25 °C for 3 h, then refluxed for 5 h. The mixture was diluted with AcOEt (40 ml) and washed with 5% Na_2CO_3 (30 ml), followed by brine (30 ml). After the standard work-up, the residue was purified by chromatography on silica gel with AcOEt : hexane (1 : 5).

4-Benzyl-2-phenyl-5-trifluoromethyloxazole (**2a**): Yield 88%, mp 75—76 °C (Et_2O–hexane). ^{1}H-NMR (270 MHz) δ: 4.04 (2H, s), 7.20—7.26 (2H, m), 7.28—7.35 (3H, m), 7.40—7.50 (3H, m), 8.00—8.07 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 32.27 (CH_2), 119.93 (CF_3, $^1J_{CF}$=267.9 Hz), 126.13 (C), 126.77 (CH), 127.07 (CH), 128.64 (CH), 128.72 (CH), 128.85 (CH), 131.49 (CH), 134.15 (C, $^2J_{CF}$=42.0 Hz), 137.35 (C), 142.30 (C, $^3J_{CF}$=2.0 Hz), 162.18 (C). MS m/z: 303 (M^+, 100). *Anal.* Calcd for

$C_{17}H_{12}F_3NO$: C, 67.33; H, 3.99; N, 4.62. Found: C, 67.46; H, 4.11; N, 4.36.

4-Benzyl-2-*tert*-butyl-5-trifluoromethyloxazole (**2b**): Yield 83%, mp 61—62 °C (hexane). ^{1}H-NMR (500 MHz) δ: 1.37 (9H, s), 3.95 (2H, s), 7.19—7.23 (2H, m), 7.25—7.31 (3H, m). ^{13}C-NMR (126 MHz) δ: 28.40 (CH_3), 32.10 (CH_2), 33.99 (C), 119.94 (CF_3, $^1J_{CF}$=266.9 Hz), 126.62 (CH), 128.55 (CH), 128.64 (CH), 133.99 (C, $^2J_{CF}$=42.4 Hz), 137.62 (C), 140.61 (C, $^3J_{CF}$=2.5 Hz), 172.15 (C). MS *m/z*: 283 (M^+, 4.1), 57 (100). *Anal.* Calcd for $C_{15}H_{16}F_3NO$: C, 63.60; H, 5.69; N, 4.94. Found: C, 63.37; H, 5.88; N, 4.78.

(*E*)-4-Benzyl-2-[2-(1-phenyl)propenyl]-5-trifluoromethyloxazole (**2c**): Yield 61%, mp 64—65 °C (hexane). ^{1}H-NMR (500 MHz) δ: 2.32 (3H, s), 4.02 (2H, s), 7.21—7.25 (1H, m), 7.28—7.34 (5H, m), 7.37—7.44 (4H, m), 7.61 (1H, br s). ^{13}C-NMR (126 MHz) δ: 14.56 (CH_3), 32.24 (CH_2), 119.91 (CF_3, $^1J_{CF}$=267.9 Hz), 123.49 (C), 126.72 (CH), 128.17 (CH), 128.44 (CH), 128.62 (CH), 128.67 (CH), 129.59 (CH), 133.98 (C, $^2J_{CF}$=41.3 Hz), 134.52 (CH), 135.83 (C), 137.43 (C), 142.01 (C, $^3J_{CF}$=2.0 Hz), 164.36 (C). MS *m/z*: 343 (M^+, 52.5), 91 (100). *Anal.* Calcd for $C_{20}H_{16}F_3NO$: C, 69.96; H, 4.70; N, 4.08. Found: C, 69.71; H, 5.00; N, 4.13.

2,4-Diphenyl-5-trifluoromethyloxazole (**2d**): Yield 92%, mp 49—50 °C (hexane). ^{1}H-NMR (270 MHz) δ: 7.40—7.53 (6H, m), 7.75—7.79 (2H, m), 8.12—8.16 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 119.85 (CF_3, $^1J_{CF}$=267.8 Hz), 126.08 (C), 127.14 (CH), 128.51 (CH), 128.61 (CH), 128.96 (CH), 129.38 (C), 129.60 (CH), 131.63 (CH), 133.38 (C, $^2J_{CF}$=42.0 Hz), 142.49 (C, $^3J_{CF}$=2.0 Hz), 161.70 (C). MS *m/z*: 289 (M^+, 100). *Anal.* Calcd for $C_{16}H_{10}F_3NO$: C, 66.44; H, 3.48; N, 4.84. Found: C, 66.48; H, 3.64; N, 5.09.

4-Phenyl-2-thienyl-5-trifluoromethyloxazole (**2e**): Yield 88%, mp 88—89 °C (hexane). ^{1}H-NMR (270 MHz) δ: 7.16 (1H, dd, *J*=3.8, 5.0 Hz), 7.42—7.49 (3H, m), 7.54 (1H, dd, *J*=1.2, 5.0 Hz), 7.73—7.75 (2H, m, ArH), 7.83 (1H, dd, *J*=1.2, 3.8 Hz). ^{13}C-NMR (67.8 MHz) δ: 119.70 (CF_3, $^1J_{CF}$=268.0 Hz), 128.23 (CH), 128.51 (C), 128.53 (CH), 128.60 (CH), 129.06 (C), 129.66 (CH), 129.86 (CH), 130.24 (CH), 132.87 (C, $^2J_{CF}$=42.0 Hz), 142.55 (C, $^3J_{CF}$=2.0 Hz), 157.88 (C). MS *m/z*: 295 (M^+, 100). *Anal.* Calcd for $C_{14}H_{18}F_3NOS$: C, 56.95; H, 2.73; N, 4.74. Found: C, 56.96; H, 2.82; N, 4.73.

2-Phenyl-4-methyl-5-trifluoromethyloxazole (**2f**): Yield 46%, mp 52—53 °C (hexane). ^{1}H-NMR (270 MHz) δ: 2.38 (3H, s), 7.45—7.52 (3H, m), 8.04—8.06 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 11.96 (CH_3), 119.95 (CF_3, $^1J_{CF}$=266.9 Hz), 126.16 (C), 126.95 (CH), 128.95 (CH), 131.49 (CH), 134.30 (C, $^2J_{CF}$=42.4 Hz), 139.71 (C, $^3J_{CF}$=2.0 Hz), 161.85 (C). MS *m/z*: 227 (M^+, 100). *Anal.* Calcd for $C_{11}H_8F_3NO$: C, 58.16; H, 3.55; N, 6.17. Found: C, 57.73; H, 3.56; N, 6.07.

4-*sec*-Butyl-2-phenyl-5-trifluoromethyloxazole (**2g**): Yield 92%, oil. High-resolution MS: Calcd for $C_{14}H_{14}F_3NO$: 269.1028. Found: 269.1030. ^{1}H-NMR (500 MHz) δ: 0.86 (3H, t, *J*=7.5 Hz), 1.30 (3H, d, *J*=7.0 Hz), 1.62—1.69 (1H, m), 1.71—1.80 (1H, m), 2.88—2.93 (1H, m), 7.44—7.51 (3H, m), 8.05—8.09 (2H, m). ^{13}C-NMR (126 MHz) δ: 12.03 (CH_3), 19.79 (CH_3), 28.71 (CH_2), 32.54 (CH), 120.15 (CF_3, $^1J_{CF}$=266.9 Hz), 126.53 (C), 127.04 (CH), 128.85 (CH), 131.28 (CH), 133.76 (C, $^2J_{CF}$=41.6 Hz), 147.88 (C, $^3J_{CF}$=2.0 Hz), 161.98 (C). MS *m/z*: 269 (M^+, 33.0), 241 (100).

2,4-Diphenyl-5-pentafluoroethyloxazole (4a) The procedure was the same as described above, except that TFAA was replaced with pentafluoropropionic anhydride: yield 92%, mp 53—54 °C (hexane). ^{1}H-NMR (270 MHz) δ: 7.45—7.54 (6H, m), 7.74—7.76 (2H, m), 8.12—8.15 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 109.79 (CF_2, J_{CF}=40.4, 252.5 Hz), 118.70 (CF_3, J_{CF}=38.3, 287.6 Hz), 125.98 (C), 127.17 (CH), 128.51 (CH), 128.83 (CH), 129.00 (CH), 129.55 (C), 129.65 (CH), 131.77 (CH), 132.24 (C, $^2J_{CF}$=38.0 Hz), 145.09 (C, $^3J_{CF}$=2.0 Hz), 162.65 (C). MS *m/z*: 339 (M^+, 100). *Anal.* Calcd for $C_{17}H_{10}F_5NO$: C, 60.19; H, 2.97; N, 4.13. Found: C, 59.96; H, 3.06; N, 3.94.

2,4-Diphenyl-5-heptafluoropropyloxazole (4b) The procedure was the same as described above, except that TFAA was replaced with heptafluorobutyric anhydride: yield 98%, mp 50—51 °C (hexane). ^{1}H-NMR (270 MHz) δ: 7.44—7.56 (6H, m), 7.72—7.73 (2H, m), 8.13—8.16 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 110—120 (m, $CF_3CF_2CF_2$), 125.97 (C), 127.18 (CH), 128.48 (CH), 128.89 (CH), 129.02 (CH), 129.61 (C), 129.64 (CH), 131.79 (CH), 132.19 (C, $^2J_{CF}$=38.0 Hz), 145.45 (C, $^3J_{CF}$=2.0 Hz), 162.82 (C). MS *m/z*: 389 (M^+, 92.0), 270 (100). *Anal.* Calcd for $C_{18}H_{10}F_7NO$: C, 55.54; H, 2.59; N, 3.60. Found: C, 55.41; H, 2.68; N, 3.70.

N-Benzyl-*N*-[3-(1,1,1-trifluoro-2-oxo-4-phenyl)butyl]-4,4,4-trifluoro-2,2-dimethyl-3-oxobutyramide (**3**): Yield 82%, mp 166—167 °C (Et_2O–hexane). ^{1}H-NMR (500 MHz) δ: 1.39 (3H, s), 1.46+1.47 (3H, s), 2.79 (1H, d, *J*=15.1 Hz), 3.46 (1H, d, *J*=16.5 Hz), 4.08 (1H, d, *J*=15.1 Hz), 4.74 (1H, d, *J*=16.5 Hz), 5.41 (1H, br s), 6.63—6.65 (2H, m), 6.88—6.91 (4H, m), 7.04—7.06 (1H, m), 7.12—7.14 (3H, m). ^{13}C-NMR (126 MHz) δ: 16.99 (CH_3), 23.37+23.39 (CH_3), 34.89 (C), 45.07 (CH_2), 45.92+45.94 (CH_2), 73.13 (C), 102.75 (C, $^2J_{CF}$=35.2 Hz), 120.93 (CF_3, $^1J_{CF}$=286.6 Hz), 123.48 (CF_3, $^1J_{CF}$=284.5 Hz), 125.65 (CH), 126.63 (CH), 126.95 (CH), 128.05 (CH), 128.13 (CH), 129.80 (CH), 132.81 (C), 136.45 (C), 178.31 (C), 180.11 (C, $^2J_{CF}$=42.0 Hz). IR (nujol) cm^{-1}: 3300—2600 (br), 1680. MS *m/z*: 473 (M^+, 0.5), 91 (100). *Anal.* Calcd for $C_{23}H_{21}F_6NO_3$: C, 58.35; H, 4.47; N, 2.96. Found: C, 58.49; H, 4.39; N, 2.80.

General Procedure for the Reactions of *N*-Acylprolines (5) with TFAA *N*-Acylproline (**5**) (1.5 mmol) was added to a stirred solution of TFAA (0.64 ml, 4.5 mmol), pyridine (0.73 ml, 9.0 mmol) and DMAP (25 mg, 0.2 mmol) in dry benzene (6 ml) at 0 °C and the mixture was stirred at 25 °C for 3 h, then refluxed for 5 h. After the reaction, the mixture was evaporated *in vacuo* and the crude trifluoroacetate was taken up in 10% HCl (3 ml)–dioxane (2 ml). This solution was stirred at 60 °C for 3 h. After the standard work-up, the crude product was purified by column chromatography on silica gel with EtOAc : hexane (1 : 4) to give the products (**7** and/or **8**).

3-(2-*tert*-Butyl-5-trifluoromethyloxazol-4-yl)propanol (**7a**): Yield 87%, bp 110 °C (1 mmHg) (bath temperature). ^{1}H-NMR (270 MHz) δ: 1.39 (9H, s), 1.85—1.95 (2H, m), 2.76 (2H, t, *J*=7.2 Hz), 3.21 (1H, br s, D_2O exchangeable), 3.69 (2H, t, *J*=5.9 Hz). ^{13}C-NMR (67.8 MHz) δ: 22.76 (CH_2), 28.37 (CH_3), 31.24 (CH_2), 34.05 (C), 61.87 (CH_2), 119.81 (CF_3, $^1J_{CF}$=267.2 Hz), 133.85 (C, $^2J_{CF}$=42.4 Hz), 141.57 (C, $^3J_{CF}$=2.5 Hz), 172.19 (C). IR (neat) cm^{-1}: 3375 (br), 1640. MS *m/z*: 251 (M^+, 9.1), 57 (100). *Anal.* Calcd for $C_{11}H_{16}F_3NO_2$: C, 52.59; H, 6.42; N, 5.57. Found: C, 52.81; H, 6.45; N, 5.32.

3-(2-Phenyl-5-trifluoromethyloxazol-4-yl)propanol (**7b**) and 6-Benzamido-1,1,1-trifluoro-2-hydroxy-3-hexanone (**8a**): **7b**: 61% yield from the less polar fraction, mp 51—52 °C (Et_2O–hexane). ^{1}H-NMR (270 MHz) δ: 1.90—2.08 (2H, m), 2.69 (1H, br s, D_2O exchangeable), 2.84 (2H, t, *J*=7.1 Hz), 3.74 (2H, t, *J*=6.5 Hz), 7.45—7.50 (3H, m), 8.02—8.06 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 22.68 (CH_2), 31.21 (CH_2), 61.79 (CH_2), 119.92 (CF_3, $^1J_{CF}$=267.8 Hz), 126.02 (C), 127.05 (CH), 128.99 (CH), 131.67 (CH), 134.27 (C, $^2J_{CF}$=42.4 Hz), 143.24 (C, $^3J_{CF}$=2.5 Hz), 162.09 (C). IR (nujol) cm^{-1}: 3400 (br), 1635. MS *m/z*: 271 (M^+, 11.6), 227 (100). *Anal.* Calcd for $C_{13}H_{12}F_3NO_2$: C, 57.57; H, 4.46; N, 5.16. Found: C, 57.45; H, 4.46; N, 5.00. **8a**: 15% yield from the more polar fraction, bp 235 °C (2 mmHg) (bath temperature). High-resolution MS: Calcd for $C_{13}H_{14}F_3NO_3$: 289.0926. Found: 289.0932. ^{1}H-NMR (270 MHz) δ: 1.84—2.01 (2H, m), 2.64—2.85 (2H, m), 3.31—3.47 (2H, m), 4.51 (1H, q, *J*=7.9 Hz), 5.00 (1H, d, *J*=6.4 Hz, D_2O exchangeable), 6.96—7.00 (1H, m, D_2O exchangeable), 7.33—7.49 (3H, m), 7.70—7.73 (2H, m). ^{13}C-NMR (67.8 MHz) δ: 23.20 (CH_2), 36.65 (CH_2, *J*=2.5 Hz), 39.15 (CH_2), 75.11 (CH, $^2J_{CF}$=31.1 Hz), 122.70 (CF_3, $^1J_{CF}$=284.0 Hz), 126.94 (CH), 128.64 (CH), 131.74 (CH), 134.13 (C), 168.62 (C), 203.82 (C). IR (neat) cm^{-1}: 3325 (br), 1730, 1640. MS *m/z*: 289 (M^+, 3.5), 105 (100).

3-[2-(4-Methoxyphenyl)-5-trifluoromethyloxazol-4-yl]propanol (**7c**) and 1,1,1-Trifluoro-2-hydroxy-6-(4-methoxybenzamido)-3-hexanone (**8b**): **7c**: 81% yield from the less polar fraction, mp 78—79 °C (Et_2O–ligroin). ^{1}H-NMR (270 MHz) δ: 1.92—2.02 (2H, m), 2.82 (2H, t, *J*=6.9 Hz), 3.06 (1H, br s, D_2O exchangeable), 3.74 (2H, t, *J*=6.4 Hz), 3.86 (3H, s), 6.96 (2H, d, *J*=8.9 Hz), 7.97 (2H, d, *J*=8.9 Hz). ^{13}C-NMR (67.8 MHz) δ: 22.72 (CH_2), 31.23 (CH_2), 55.45 (CH_3), 61.77 (CH_2), 114.42 (CH), 118.63 (C), 120.02 (CF_3, $^1J_{CF}$=267.8 Hz), 128.83 (CH), 133.63 (C, $^2J_{CF}$=42.3 Hz), 143.08 (C, $^3J_{CF}$=2.5 Hz), 162.20 (C), 162.40 (C). IR (nujol) cm^{-1}: 3425 (br), 1610. MS *m/z*: 301 (M^+, 18.7), 257 (100). *Anal.* Calcd for $C_{14}H_{14}F_3NO_2$: C, 55.82; H, 4.68; N, 4.65. Found: C, 55.73; H, 4.72; N, 4.40. 8b: 6% yield from the more polar fraction, oil. High-resolution MS: Calcd for $C_{14}H_{16}F_3NO_4$: 319.1031. Found: 319.1045. ^{1}H-NMR (270 MHz) δ: 1.88—2.03 (2H, m), 2.71—2.79 (2H, m), 3.35—3.43 (2H, m), 3.81 (3H, s), 4.52 (1H, q, *J*=7.4 Hz), 6.87 (2H, d, *J*=8.9 Hz), 7.69 (2H, d, *J*=8.9 Hz). ^{13}C-NMR (67.8 MHz) δ: 23.25 (CH_2), 36.65 (CH_2), 39.07 (CH_2), 55.41 (CH_3), 75.11 (CH, $^2J_{CF}$=31.2 Hz), 113.85 (CH), 122.74 (CF_3, $^1J_{CF}$=284.1 Hz), 126.28 (C), 128.81 (CH), 162.40 (C), 168.18 (C), 204.08 (C). IR (neat) cm^{-1}: 3300 (br), 1730, 1640. MS *m/z*: 319 (M^+, 3.0), 135 (100).

3-[2-(4-Chlorophenyl)-5-trifluoromethyloxazol-4-yl]propanol (**7d**) and 6-(4-Chlorobenzamido)-1,1,1-trifluoro-2-hydroxy-3-hexanone (**8c**): **7d**: 46% yield from the less polar fraction, mp 65—66 °C (ligroin).

^{1}H-NMR (270 MHz) δ: 1.93—2.03 (2H, m), 2.83 (2H, t, J=6.9 Hz), 2.95 (1H, br s, D_2O exchangeable), 3.74 (2H, t, J=6.9 Hz), 7.43 (2H, d, J=8.4 Hz), 7.95 (2H, d, J=8.4 Hz). ^{13}C-NMR (67.8 MHz) δ: 22.61 (CH_2), 31.21 (CH_2), 61.68 (CH_2), 119.78 (CF_3, $^1J_{CF}$=266.6 Hz), 124.46 (C), 128.28 (CH), 129.36 (CH), 134.45 (C, $^2J_{CF}$=42.4 Hz), 137.98 (C), 143.43 (C, $^3J_{CF}$=2.5 Hz), 161.12 (C). IR (nujol) cm^{-1}: 3400 (br), 1630. MS m/z: 305 (19.8)+307 (6.6) (M^+), 261 (100). *Anal.* Calcd for $C_{13}H_{11}ClF_3NO_2$: C, 51.08; H, 3.63; N, 4.58. Found: C, 50.90; H, 3.55; N, 4.53. **8c**: 25% yield from the more polar fraction, oil. ^{1}H-NMR (270 MHz) δ: 1.89—2.03 (2H, m), 2.69—2.81 (2H, m), 3.38—3.45 (2H, m), 4.55 (1H, q, J=7.4 Hz), 4.80 (1H, br s, D_2O exchangeable), 6.89 (1H, br s), 7.35 (2H, d, J=8.9 Hz), 7.65 (2H, d, J=8.9 Hz). ^{13}C-NMR (67.8 MHz) δ: 23.12 (CH_2), 36.76 (CH_2), 39.26 (CH_2), 75.09 (CH, $^2J_{CF}$=31.1 Hz), 122.62 (CF_3, $^1J_{CF}$=282.7 Hz), 128.37 (CH), 128.88 (CH), 132.46 (C), 138.00 (C), 167.46 (C), 203.68 (C). IR (neat) cm^{-1}: 3300 (br), 1730, 1635. MS m/z: 323 (1.1)+325 (0.4) (M^+), 139 (100).

3-[2-(2-Phenyl-1-methylvinyl)-5-trifluoromethyloxazol-4-yl]propanol (**7e**) and 1,1,1-Trifluoro-2-hydroxy-6-(2-methyl-3-phenylpropenamido)-3-hexanone (**8d**): **7e**: 65% yield from the less polar fraction, mp 53—54 °C (Et_2O–hexane). ^{1}H-NMR (270 MHz) δ: 1.90—2.00 (2H, m), 2.32+2.33 (3H, s), 2.81 (2H, tq, J=1.5, 5.9 Hz), 2.78—3.00 (1H, br, D_2O exchangeable), 3.73 (2H, t, J=5.9 Hz), 7.29—7.45 (5H, m), 7.60+7.61 (1H, s). ^{13}C-NMR (67.8 MHz) δ: 14.50 (CH_3), 22.52 (CH_2), 31.21 (CH_2), 61.81 (CH_2), 119.90 (CF_3, $^1J_{CF}$=266.6 Hz), 123.31 (C), 128.30 (CH), 128.50 (CH), 129.63 (CH), 133.56 (C), 134.77 (CH), 135.76 (C), 142.91 (C), 164.22 (C). IR (nujol) cm^{-1}: 3430, 1640, 1630. MS m/z: 311 (M^+, 81.0), 310 (100). *Anal.* Calcd for $C_{16}H_{16}F_3NO_2$: C, 61.73; H, 5.18; N, 4.50. Found: C, 61.55; H, 5.21; N, 4.47. **8d**: 10% yield from the more polar fraction, oil. High-resolution MS: Calcd for $C_{16}H_{18}F_3NO_3$: 329.1239. Found: 329.1225. ^{1}H-NMR (270 MHz) δ: 1.89—2.06 (2H, m), 2.06+2.07 (3H, s), 2.69—2.87 (2H, m), 3.35—3.43 (2H, m), 4.56 (1H, q, J=7.4 Hz), 4.66 (1H, br s), 6.28 (1H, br s), 7.24—7.41 (5H, m). ^{13}C-NMR (67.8 MHz) δ: 15.78 (CH_3), 24.98 (CH_2), 38.22 (CH_2), 40.62 (CH_2), 76.77 (CH, $^2J_{CF}$=31.3 Hz), 122.60 (CF_3, $^1J_{CF}$=284.1 Hz), 129.61 (CH), 130.01 (CH), 130.96 (CH), 133.11 (C), 136.06 (CH), 137.53 (C), 172.04 (C), 205.17 (C). IR (neat) cm^{-1}: 3300 (br), 1730, 1620. MS m/z: 329 (M^+, 28.1), 145 (100).

2-Trifluoroacetyl-*N*-(4,4,4-trifluoro-2,2-dimethyl-3-oxobutyryl)pyrrolidine (**9**) and 2-Hydroxy-1,1,1-trifluoro-6-(4,4,4-trifluoro-2,2-dimethyl-3-oxobutyramido)-3-hexanone (**8e**): **9**: 41% yield from the less polar fraction, mp 132—133 °C (CH_2Cl_2–hexane). ^{1}H-NMR (270 MHz) δ: 1.22 (6H, s), 1.63—1.82 (1H, m), 2.17—2.34 (2H, m), 2.50—2.80 (1H, m), 3.04—3.19 (1H, m), 3.54—3.65 (1H, m), 6.97 (1H, s, D_2O exchangeable). ^{13}C-NMR (67.8 MHz) δ: 20.68 (CH_3), 24.28 (CH_2), 24.90 (CH_2), 41.95 (C), 52.11 (CH_2), 80.71 (C), 84.00 (C, $^2J_{CF}$=32.5 Hz), 116.62 (CF_3, $^1J_{CF}$=291.5 Hz), 125.76 (CF_3, $^1J_{CF}$=287.7 Hz), 176.32 (C), 191.50 (C, $^2J_{CF}$=42.1 Hz). IR (nujol) cm^{-1}: 3250 (br), 1765, 1680. CI-MS m/z: 334 (M^++1, 100). *Anal.* Calcd for $C_{12}H_{13}F_6NO_3$: C, 43.25; H, 3.93; N, 4.20. Found: C, 43.05; H, 4.17; N, 3.98. **8e**: 29% yield from the more polar fraction, oil. High-resolution MS: Calcd for $C_{10}H_{16}F_3NO_3$: 255.1082. Found: 255.1074. ^{1}H-NMR (270 MHz) δ: 1.13 (6H, d, J=6.9 Hz), 1.81—1.93 (2H, m), 2.31—2.41 (2H, m), 2.69—2.78 (2H, m), 3.21—3.30 (2H, m), 4.54 (1H, q, J=7.9 Hz), 4.70—5.05 (1H, br, D_2O exchangeable), 6.15 (1H, br s, D_2O exchangeable). ^{13}C-NMR (67.8 MHz) δ: 19.53 (CH_3), 23.29 (CH_2), 35.61 (CH), 36.36 (CH_2), 38.40 (CH_2), 75.16 (CH, $^2J_{CF}$=31.1 Hz), 122.74 (CF_3, $^1J_{CF}$=284.1 Hz), 178.30 (C), 203.82 (C). IR (neat) cm^{-1}: 3300 (br), 1730, 1640. MS m/z: 255 (M^+, 8.8), 86 (100).

***N*-(2,6-Dichlorobenzoyl)-2-(2,2,2-trifluoro-1,1-dihydroxyethyl)pyrrolidine (11a)** A solution of **10a** (510 mg, 1.5 mmol) and 10% HCl (3 ml) in dioxane (2 ml) was stirred at 60 °C for 3 h. After the standard work-up, the residue was purified by column chromatography on silica gel with EtOAc : hexane (1 : 3) to give **11a** (497.5 mg, 93%). mp 89—91 °C (Et_2O–hexane). ^{1}H-NMR (270 MHz) δ: 1.70—2.50 (4H, m), 3.20—3.50 (2H, m), 4.13 (1H, br s, D_2O exchangeable), 4.63—4.69+5.11—5.18 (1H, m), 7.27—7.39 (3H, m), 8.08 (1H, br s, D_2O exchangeable). ^{13}C-NMR (67.8 MHz) δ: 24.66+24.97 (CH_2), 27.14+28.88 (CH_2), 47.56+49.84 (CH_2), 59.32+62.12 (CH), 95.42 (C, $^2J_{CF}$=29.9 Hz), 123.12 (CF_3, $^1J_{CF}$=287.8 Hz), 128.02+128.46 (CH), 130.74+131.14 (CH), 131.40+132.15 (C), 134.66+134.88 (C), 163.67+168.69 (C), 188.57 (C, $^2J_{CF}$=42.0 Hz). IR (neat) cm^{-1}: 3300 (br), 1605. MS m/z: 339 (0.2)+341 (0.1)+343 (0.02) (M^+), 173 (100). *Anal.* Calcd for $C_{13}H_{12}Cl_2F_3NO_3$: C, 43.60; H, 3.38; N, 3.91. Found: C, 43.75; H, 3.40; N, 3.73.

2-(2,2,2-Trifluoro-1,1-dihydroxyethyl)-*N*-(2,4,6-trimethylbenzoyl)pyrrolidine (11b) and 2-Hydroxy-1,1,1-trifluoro-6-(2,4,6-trimethylbenzamido)-3-hexanone (8f) The procedure was the same as described above. **11b**: 72% yield from the less polar fraction. mp 121—124 °C (AcOEt–hexane). ^{1}H-NMR (270 MHz) δ: 1.60—2.40 (4H, m), 2.16+2.19 (3H, s), 2.26+2.28 (6H, s), 3.18—3.24 (2H, m), 4.59—5.13 (1H, m), 4.65 (1H, br s, D_2O exchangeable), 6.85 (1H, br s), 6.87 (1H, br s), 8.71 (1H, br s, D_2O exchangeable). ^{13}C-NMR (67.8 MHz) δ: 18.50+18.59 (CH_3), 18.85+21.09 (CH_3), 24.79+25.19 (CH_2), 27.17+28.92 (CH_2), 47.88+50.02 (CH_2), 58.97+61.46 (CH), 95.51 (C, $^2J_{CF}$=31.1 Hz), 123.31 (CF_3, $^1J_{CF}$=289.0 Hz), 128.22+128.64 (CH), 132.24+132.97 (C), 134.05+134.33 (C), 138.58+138.84 (C), 170.01+174.92 (C), 189.54 (C, $^2J_{CF}$=42.0 Hz). IR (nujol) cm^{-1}: 3320 (br), 1615, 1590. MS m/z: 313 (M^+-H_2O, 8.8), 147 (100). *Anal.* Calcd for $C_{16}H_{20}F_3NO_3$: C, 58.00; H, 6.08; N, 4.23. Found: C, 57.91; H, 6.15; N, 4.27. **8f**: 19% yield from the more polar fraction, oil. High-resolution MS: Calcd for $C_{16}H_{20}F_3NO_3$: 311.1396. Found: 331.1359. ^{1}H-NMR (270 MHz) δ: 1.85—1.92 (2H, m), 2.18 (6H, s), 2.25 (3H, s), 2.69—2.77 (2H, m), 3.30—3.40 (2H, m), 4.39 (1H, q, J=7.9 Hz), 6.18 (1H, br s), 6.78 (2H, s). ^{13}C-NMR (67.8 MHz) δ: 18.94 (CH_3), 21.03 (CH_3), 23.23 (CH_2), 36.45 (CH_2), 38.60 (CH_2), 74.97 (CH, $^2J_{CF}$=31.2 Hz), 122.65 (CF_3, $^1J_{CF}$=284.0 Hz), 128.24 (CH), 133.96 (C), 134.40 (C), 138.66 (C), 171.59 (C), 203.45 (C). IR (neat) cm^{-1}: 3250 (br), 1725, 1635. MS m/z: 331 (M^+, 7.0), 147 (100).

The following compounds were prepared in good yields by the same procedure as described for the preparation of **2**.

3-(2-*tert*-Butyl-5-trifluoromethyloxazol-4-yl)propyl Trifluoroacetate (**6a**): Yield 57%, bp 105 °C (4 mmHg) (bath temperature). ^{1}H-NMR (270 MHz) δ: 1.39 (9H, s), 2.01—2.11 (2H, m), 2.67 (2H, t, J=6.7 Hz), 4.30 (2H, t, J=6.7 Hz). ^{13}C-NMR (67.8 MHz) δ: 22.10 (CH_2), 26.85 (CH_2), 28.39 (CH_3), 34.07 (C), 67.03 (CH_2), 114.58 (CF_3, $^1J_{CF}$=285.4 Hz), 119.86 (CF_3, $^1J_{CF}$=267.2 Hz), 134.20 (C, $^2J_{CF}$=41.9 Hz), 140.31 (C, $^3J_{CF}$=2.2 Hz), 157.50 (C, $^2J_{CF}$=42.4 Hz), 172.45 (C). IR (neat) cm^{-1}: 1790 (br), 1635. MS m/z: 347 (M^+, 8.3), 57 (100). *Anal.* Calcd for $C_{13}H_{15}F_6NO_3$: C, 44.97; H, 4.35; N, 4.03. Found: C, 44.70; H, 4.40; N, 3.79.

1-[*N*-(2,6-Dichlorobenzoyl)pyrrolidin-2-ylidene]-2,2,2-trifluoroethyl Trifluoroacetate (**10a**): Yield 95%, oil. ^{1}H-NMR (270 MHz) δ: 2.01—2.12 (2H, m), 2.94 (2H, t, J=7.0 Hz), 3.49 (2H, t, J=7.0 Hz), 7.30—7.38 (3H, m). ^{13}C-NMR (67.8 MHz) δ: 21.86 (CH_2), 28.82 (CH_2), 50.53 (CH_2), 114.48 (CF_3, $^1J_{CF}$=285.2 Hz), 120.91 (CF_3, $^1J_{CF}$=272.8 Hz), 121.28 (C, $^2J_{CF}$=34.5 Hz), 128.41 (CH), 128.48 (CH), 131.38 (CH), 135.19 (C), 137.44 (C), 155.75 (C, $^2J_{CF}$=42.0 Hz), 162.42 (C). IR (neat) cm^{-1}: 1820, 1700, 1670, 1655, 1620. MS m/z: 435 (0.3)+437 (0.1)+439 (0.02) (M^+), 173 (100).

1-[*N*-(2,4,6-Trimethylbenzoyl)pyrrolidin-2-ylidene]-2,2,2-trifluoroethyl Trifluoroacetate (**10b**): Yield 87%, mp 140—142 °C (AcOEt–hexane). ^{1}H-NMR (270 MHz) δ: 1.93—2.01 (2H, m), 2.20 (6H, s), 2.92 (2H, t, J=6.9 Hz), 3.34 (2H, t, J=6.9 Hz), 6.86 (2H, s). ^{13}C-NMR (67.8 MHz) δ: 18.92 (CH_3), 21.09 (CH_3), 22.00 (CH_2), 28.99 (CH_2), 51.21 (CH_2), 114.55 (CF_3, $^1J_{CF}$=285.2 Hz), 120.52 (C, $^2J_{CF}$=34.5 Hz), 121.15 (CF_3, $^1J_{CF}$=272.8 Hz), 128.77 (CH), 133.54 (C), 133.71 (C), 137.79 (C), 139.35 (C), 156.61 (C, $^2J_{CF}$=42.0 Hz), 169.11 (C). IR (nujol) cm^{-1}: 1820, 1690, 1655, 1615. MS m/z: 409 (M^+−2, 0.2), 147 (100). *Anal.* Calcd for $C_{18}H_{17}F_6NO_3$: C, 53.05; H, 4.17; N, 3.41. Found: C, 52.96; H, 4.43; N, 3.41.

2-*tert*-Butyl-5-trifluoromethyl-4-(3-methoxypropyl)oxazole (13) A solution of **7a** (306 mg, 1.2 mmol) in DMF (2 ml) was added to a suspension of NaH (73 mg, 60% dispersion in mineral oil, 1.8 mmol) in DMF (2 ml) at 0 °C for 10 min. The mixture was stirred at 25 °C for 0.5 h, then a solution of methyl iodide (0.1 ml, 1.6 mmol) in DMF (1 ml) was added at 0 °C for 10 min. The resulting mixture was stirred for 3.5 h at 25 °C and then diluted with Et_2O (50 ml) and H_2O (30 ml). After the standard work-up, the residue was chromatographed on a column of silica gel with AcOEt : hexane (1 : 5) to give **13** (266 mg, 82%) as an oil, bp 85 °C (1 mmHg) (bath temperature). High-resolution MS: Calcd for $C_{12}H_{18}F_3NO_2$: 265.1290. Found: 265.1305. ^{1}H-NMR (270 MHz) δ: 1.39 (9H, s), 1.88—1.98 (2H, m), 2.69 (2H, t, J=6.5 Hz), 3.33 (3H, s), 3.40 (2H, t, J=6.5 Hz). ^{13}C-NMR (67.8 MHz) δ: 22.70 (CH_2), 28.44 (CH_3), 28.59 (CH_2), 34.03 (C), 58.51 (CH_3), 71.64 (CH_2), 120.11 (CF_3, $^1J_{CF}$=267.6 Hz), 133.84 (C, $^2J_{CF}$=42.3 Hz), 141.88 (C, $^3J_{CF}$=2.2 Hz), 172.03 (C). IR (neat) cm^{-1}: 1640. MS m/z: 265 (M^+, 4.9), 57 (100).

3-[2-(4-Methoxyphenyl)-5-trifluoromethyloxazol-4-yl]propanal (14) A solution of **7c** (320 mg, 1.06 mmol) and pyridinium chlorochromate (PCC, 458 mg, 2.12 mmol) in dry CH_2Cl_2 (5 ml) was stirred for 4 h at 25 °C. After the reaction, the mixture was filtered through a Celite pad

and the filtrate was concentrated *in vacuo*. The residue was chromatographed on a column of silica gel with AcOEt : hexane (1 : 2) to give **14** (254.8 mg, 80%). mp 55—57 °C (hexane). ^{1}H-NMR (270 MHz) δ: 2.89—2.94 (2H, m), 3.00—3.05 (2H, m), 3.86 (3H, s), 6.97 (2H, d, J=8.9 Hz), 7.97 (2H, d, J=8.9 Hz), 9.87 (1H, s). ^{13}C-NMR (67.8 MHz) δ: 18.83 (CH_2), 41.84 (CH_2), 55.47 (CH_3), 114.42 (CH), 118.76 (C), 119.94 (CF_2, $^1J_{CF}$=267.8 Hz), 128.83 (CH), 133.80 (C, $^2J_{CF}$=41.6 Hz), 141.79 (C), 162.33 (C), 162.40 (C), 200.36 (C). IR (nujol) cm^{-1}: 1705, 1615. MS *m/z*: 299 (M^+, 13.1), 271 (100). *Anal.* Calcd for $C_{14}H_{12}F_3NO_3$: C, 56.19; H, 4.04; N, 4.68. Found: C, 56.20; H, 4.21; N, 4.74.

3-[2-Phenyl-5-trifluoromethyloxazol-4-yl]propyl Formate (15) A solution of **7b** (281 mg, 1.04 mmol) and ammonium formate (327 mg, 5.18 mmol) in xylene (5 ml) was refluxed for 37 h. The mixture was diluted with AcOEt (50 ml), then washed with 5% Na_2CO_3 (30 ml) and brine. After the standard work-up, the residue was chromatographed on a column of silica gel with AcOEt : hexane (1 : 3) to give **15** (266.6 mg, 86%) as an oil. High-resolution MS: Calcd for $C_{14}H_{12}F_3NO_3$: 299.0770. Found: 299.0793. ^{1}H-NMR (270 MHz) δ: 2.09—2.18 (2H, m), 2.79—2.86 (2H, m), 4.25 (2H, t, J=6.4 Hz), 7.46—7.53 (3H, m), 8.01—8.08 (2H, m), 8.08 (1H, s). IR (neat) cm^{-1}: 1730. MS *m/z*: 299 (M^+, 33.7), 240 (100).

1-Butoxyethyl 3-[2-(4-Methoxyphenyl)-5-trifluoromethyloxazol-4-yl]-propyl Ether (16) A solution of **7c** (200 mg, 0.66 mmol) and butyl vinyl ether (0.17 ml, 1.33 mmol) in benzene (5 ml) was refluxed for 26 h. The mixture was concentrated *in vacuo* and the residue was chromatographed on a column of silica gel with AcOEt : hexane (1 : 4) to give **16** (250 mg, 94%) as an oil. ^{1}H-NMR (270 MHz) δ: 0.91 (3H, t, J=7.4 Hz), 1.31 (3H, d, J=5.4 Hz), 1.34—1.41 (2H, m), 1.49—1.57 (2H, m), 1.97—2.05 (2H, m), 2.75—2.81 (2H, m), 3.37—3.51 (2H, m), 3.56—3.67 (2H, m), 3.87 (3H, s), 4.69 (1H, q, J=5.4 Hz), 6.97 (2H, d, J=8.9 Hz), 7.99 (2H, d, J=8.9 Hz). ^{13}C-NMR (67.8 MHz) δ: 13.88 (CH_3), 19.47 (CH_2), 19.77 (CH_2), 22.90 (CH_2), 28.75 (CH_2), 32.05 (CH_2), 55.45 (CH_3), 64.18 (CH_2), 65.15 (CH_2), 99.84 (CH), 114.36 (CH), 119.02 (C), 120.13 (CF_3, $^1J_{CF}$=267.9 Hz), 128.77 (CH), 133.87 (C, $^2J_{CF}$=42.8 Hz), 143.39 (C), 162.11 (C), 162.27 (C). IR (neat) cm^{-1}: 1615. MS *m/z*: 401 (M^+, 0.7), 284 (100).

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