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Pd(OAc)$_2$-Catalyzed, AgOAc-Promoted *Z* Selective Directed *β*-Arylation of Acrylamide Systems and Stereoselective Construction of *Z*-Cinnamamide Scaffolds

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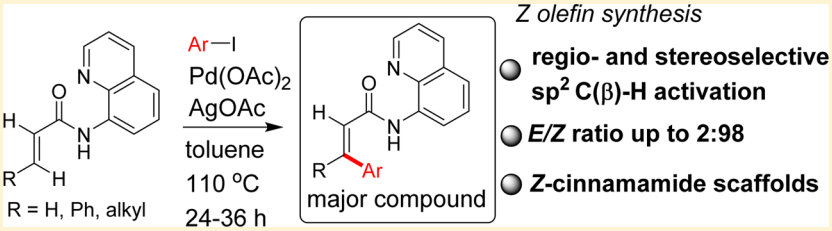
Supporting Information



ABSTRACT: A Pd(OAc)$_2$-catalyzed, AgOAc-promoted and bidentate ligand-directed *Z* selective C−H activation, followed by the *β*-arylation of the C(sp^2)−H bond of *N*-(quinolin-8-yl)acrylamide systems with aryl- and heteroaryl iodides, and a contemporary method for the construction of various *Z*-cinnamamides and *β*,*β*-diarylated acrylamides are reported. A plausible reaction mechanism comprising the bidentate ligand-aided, chelation-based C−H functionalization was proposed for the observed *Z* selective *β*-arylation of *N*-(quinolin-8-yl)acrylamide systems.

INTRODUCTION

Transition-metal-catalyzed sp^2 and sp^3 C−H activation/functionalization reactions have received substantial attention in recent years.[1−3] Catalytic C−H activation/functionalization reactions are considered as economical cross-coupling methods, because (a) they are a direct way for forming the C−C bonds and, generally, the prior preparation of organometallic reagents is not required, and (b) in many cases, the suppression of waste/side-products and usage of readily available starting materials are possible. Among the transition-metal catalysts, especially, the palladium catalysts are widely employed to perform the C−H functionalization reactions.[1−3] While the unassisted C−H functionalization of organic molecules remains a less explored area, the C−H functionalization of sp^2 or sp^3 C−H bonds of organic molecules directed by the heteroatom-containing functional groups has been extensively studied.[1−3] Particularly, the recent studies by various research groups exposed the potential of the bidentate directing groups (e.g., 8-aminoquinoline) in the research topic pertaining to the sp^2 and sp^3 C−H functionalization reactions.[3]

Cinnamamide derivatives represent an important class of agrochemicals, and several cinnamamide derivatives (e.g., dimethomorph, flumorph, and pyrimorph, Figure 1) exhibit herbicidal and fungicidal activities[4b] and a wide range of biological activities,[4−7] such as antituberculosis, anticonvulsant, analgesic, antidepressant, antifungal, and antiestrogenic agents, and function as mPTP inhibitors,[5] KCNQ2 potassium channel openers,[6] and vanilloid receptor-1 antagonists.[7] Cinnamamide derivatives were also used as starting materials for assembling heterocyclic compounds (e.g., quinolones).[8] Generally, cinnamamide derivatives (*β*-arylated acrylamide derivatives) were prepared using the traditional synthetic methods or the celebrated Pd-catalyzed Mizoroki−Heck reaction[9] of acrylic acid based substrates with a suitable coupling partner. Apart from these methods, the *β*-arylated acrylic acid derivatives were also assembled via the oxidative Heck-type arylation tactic involving the reaction of acrylic acid based substrates with arenes or nucleophilic aryl metal reagents.[9−11] Usually, in these reactions, the corresponding *β*-arylated acrylic acid derivatives having the *E* geometry were obtained as the major isomers. On the other hand, the exclusive preparation of *β*-arylated acrylic acid derivatives including cinnamamides having the *Z* geometry under the traditional procedures is infrequently explored.[4a,9]

With regard to some of the notable methods dealing with the construction of *β*-arylated acrylamides having the *Z* geometry via the C−H functionalization,[10,11] Glorius's group reported[10a] the *Z* selective *β*-arylation of the substrate **1a** via the [Rh^{III}Cp*]-catalyzed CDC reaction (Scheme 1). Ackermann's group reported[10d] an attractive reaction involving an iron-catalyzed *Z* selective *β*-arylation of triazolyldimethylmethyl (TAM) amide (**1b**, Scheme 1). Recently, Ilies and Nakamura reported[10e] an interesting reaction involving the *β*-alkylation of *N*-(quinolin-8-yl)acrylamide (**1e**) with alkyl tosylate in the presence of Fe(acac)$_3$/diphosphine and ArZnBr as a base.

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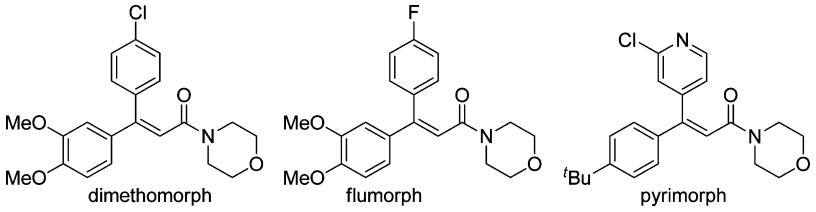
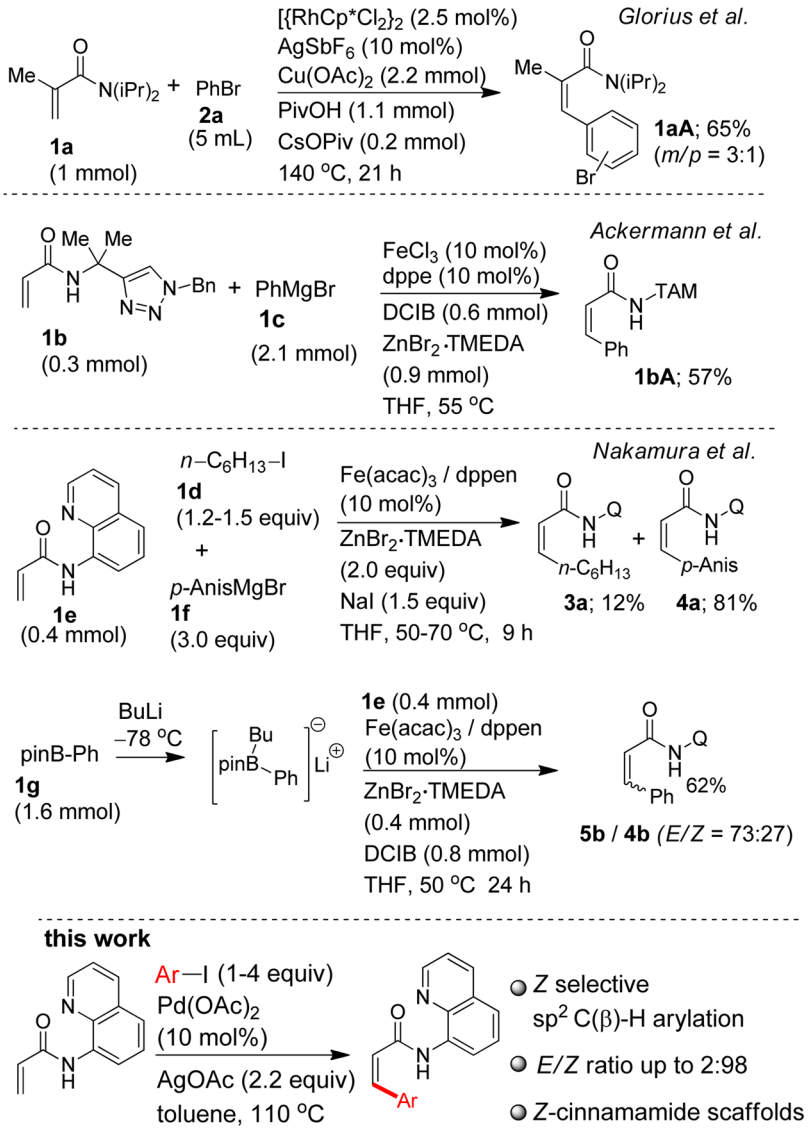


Figure 1. Examples of cinnamamide-based agrochemicals.

Scheme 1. Pioneering Examples of *Z* Selective *β*-Arylation of Acrylamide Systems and Theme of This Work



In one of the reactions, the *β*-arylated acrylamide **4a** (*Z* isomer) was obtained along with the *β*-alkylated acrylamide product **3a** (Scheme 1). Subsequently, Ilies and Nakamura reported[10f] the *β*-arylation of the substrate **1e** with an organoborate reagent in the presence of the iron and zinc catalysts, which afforded the corresponding *β*-arylated acrylamides **5b**/**4b** (*E*/*Z* isomers, Scheme 1).

In continuation of our interest in the bidentate ligand-assisted C−H functionalization reactions,[12] we envisaged $Pd(OAc)_2$-catalyzed AgOAc-mediated, bidentate ligand 8-aminoquinoline-directed, *β*-arylation of *N*-(quinolin-8-yl)-acrylamide systems. To the best of our knowledge, the theme comprising $Pd(OAc)_2$-catalyzed, AgOAc-promoted *β*-arylation of *N*-(quinolin-8-yl)acrylamide systems has not been explored. Herein, we report the stereoselective construction of various cinnamamide scaffolds having the *Z* geometry and *β*,*β*-diarylated acrylamides via the $Pd(OAc)_2$-catalyzed C−H activation, followed by the *β*-arylation of *N*-(quinolin-8-yl)-acrylamides. This work demonstrates a contemporary route for the *β*-arylation of acrylamide systems involving the straightforward experimental conditions, in which commercially available aryl- or heteroaryl iodide is a coupling partner and $Pd(OAc)_2$ is a catalyst and AgOAc works as an additive to regenerate the $Pd(OAc)_2$ catalyst.

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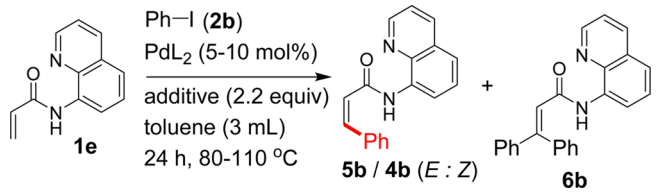
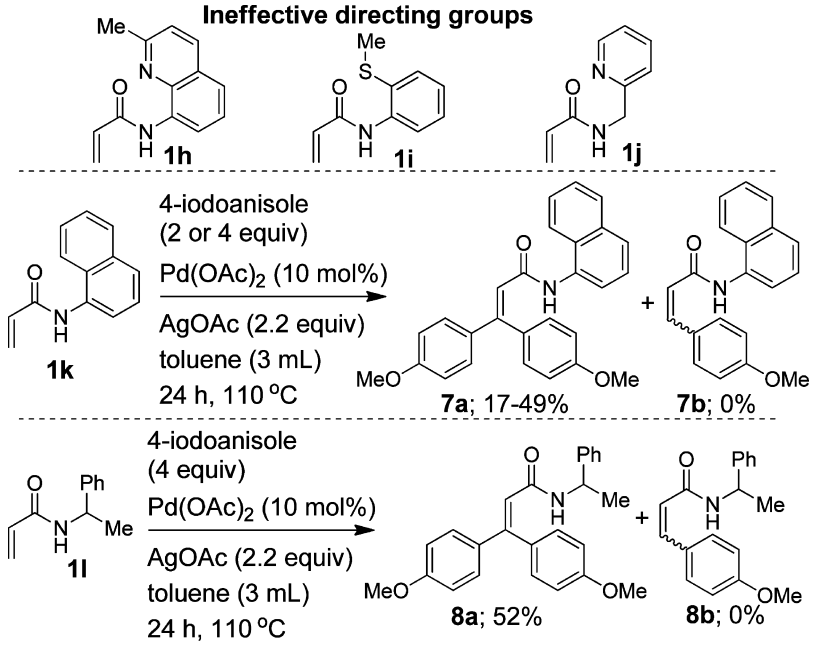
Table 1. Optimization of Reaction Conditions



entry	PdL_2 (mol %)	additive	T (°C)	yield (%)[a] 5b/4b	5b/4b E:Z
1	$Pd(OAc)_2$ (5)	AgOAc	110	73	9:91
2	**$Pd(OAc)_2$ (10)**	AgOAc	**110**	**87**	**11:89**
3	$Pd(OAc)_2$ (10)	Ag_2CO_3	110	36	12:88
4	$Pd(OAc)_2$ (10)	K_2CO_3	110	29	59:41
5	$Pd(OAc)_2$ (10)	KOAc	110	57	35:65
6	$PdCl_2$ (10)	AgOAc	110	58	10:90
7	$Pd(TFA)_2$ (10)	AgOAc	110	58	17:83
8	$Pd(CH_3CN)_2Cl_2$ (10)	AgOAc	110	32	28:72
9[b]	$Pd(OAc)_2$ (10)	AgOAc	80	44	2:98
10[c]	$Pd(OAc)_2$ (10)	AgOAc	85	36	17:83
11[d]	$Pd(OAc)_2$ (10)	AgOAc	105	63	12:88
12[e]	$Pd(OAc)_2$ (10)	AgOAc	110	73	10:90
13[f]	$Pd(OAc)_2$ (10)	AgOAc	110	55	11:89
14[g]	$Pd(OAc)_2$ (10)	AgOAc	110	37	10:90
15[h]	$Pd(OAc)_2$ (10)	AgOAc	110	0	
16[i]	$Pd(OAc)_2$ (10)	AgOAc	110	0	

[a]The reactions were performed using **1e** (0.25 mmol) and **2b** (4 equiv), and in these reactions, the product **6b** was not obtained in the column purification though traces of **6b** seen in the crude NMR of some cases. The E/Z ratios of diastereomers were determined from the NMR spectra of the crude reaction mixtures. [b]The reaction was performed in 1,2-DCE. [c]The reaction was performed in *tert*-butanol. [d]The reaction was performed in *tert*-amyl alcohol. [e]3 equiv of **2b** was used. [f]2 equiv of **2b** was used. [g]1 equiv of **2b** was used. [h]In this reaction, bromobenzene (**2a**) was used instead of **2b**. [i]In this reaction, chlorobenzene (**2c**) was used instead of **2b**.

Scheme 2. Screening of Ligands and Conditions for the β-Arylation of the Substrates 1h–1l[a]



[a]All the reactions were carried out using 0.25 mmol of **1k** or **1l**.

RESULTS AND DISCUSSION

At the outset, to find out the best reaction conditions for achieving the Z selective β-arylation of the substrate **1e** (derived from acryloyl chloride and Daugulis's ligand), we carried out several reactions comprising the bidentate ligand 8-aminoquinoline-directed C–H activation, followed by the β-arylation of the substrate **1e** in the presence the $Pd(OAc)_2$ catalyst (Table 1). The C–H arylation reaction of a mixture of **1e** (1 equiv), iodobenzene (**2b**, 4 equiv), $Pd(OAc)_2$ catalyst (5 mol %), and AgOAc (additive, 2.2 equiv) in toluene at 110 °C afforded the mono-β-arylated acrylamides **5b**/**4b** (E/Z isomers) in 73% yield with E/Z ratio 9:91 (entry 1, Table 1). Notably,

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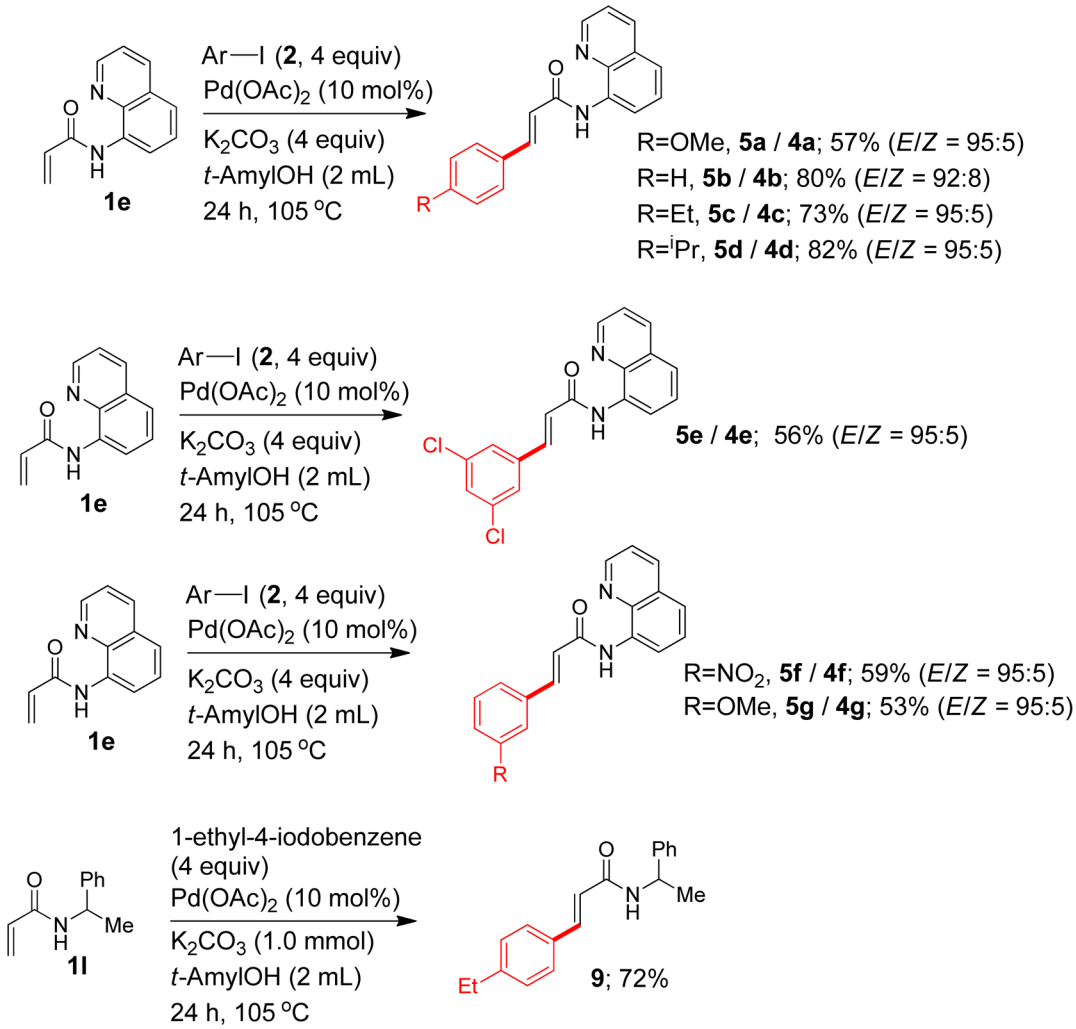
Scheme 3. Pd-Catalyzed β-Arylation of 1e and 1l in the Presence of K_2CO_3[a,b]



[a]The E/Z ratios of diastereomers were determined from the NMR spectra of the crude reaction mixtures. All the reactions were carried out using 0.25 mmol of **1e** or **1l**. [b]In some case, the crude NMR revealed the presence of traces of the corresponding Z isomers and the diarylated compounds.

this reaction afforded the β-arylated acrylamide **4b** having the Z stereochemistry as the major isomer. The same reaction in the presence of 10 mol % of the $Pd(OAc)_2$ catalyst furnished the mono-β-arylated acrylamides **5b**/**4b** (E/Z isomers) with slightly improved yield (87%) with E/Z ratio 11:89 (entry 2, Table 1). The Pd-catalyzed arylation of **1e** with **2b** in the presence of Ag_2CO_3 instead of AgOAc gave the products **5b**/**4b** in only 36% yield (entry 3, Table 1). The arylation of **1e** with iodobenzene (**2b**) in the presence of other additives, such as K_2CO_3 or KOAc, gave the products **5b**/**4b** (E/Z isomers) in low yields with poor E/Z selectivity (entries 4 and 5, Table 1). Usage of other palladium catalysts, such as $PdCl_2$, $Pd(TFA)_2$, and $Pd(CH_3CN)_2Cl_2$ instead of $Pd(OAc)_2$, gave the products **5b**/**4b** (E/Z isomers) in 32−58% yields with an E/Z ratio up to 10:90 (entries 6−8, Table 1). The reaction of substrate **1e** with iodobenzene (**2b**) in other solvents, such as 1,2-DCE or *tert*-butanol or *tert*-amyl alcohol, gave the products **5b**/**4b** (E/Z isomers) in 44% (E/Z ratio = 2:98, entry 9, Table 1), 36% (E/Z ratio = 17:83, entry 10, Table 1), and 63% yields (E/Z ratio = 12:88, entry 11, Table 1), respectively. When compared to the reaction comprising the arylation of substrate **1e** with 4 equiv of iodobenzene (**2b**, entry 2), the yield of the products **5b**/**4b** (E/Z isomers) proportionately decreased in the reaction comprising the arylation of substrate **1e** with 3 or 2 or 1 equiv of iodobenzene (**2b**, entries 12−14, Table 1). The arylation of **1e** with the coupling partners other than iodobenzene (**2b**), such as bromobenzene (**2a**) or chlorobenzene (**2c**), was ineffective (entries 15 and 16, Table 1).

Next, to find out the other working directing groups, we performed the arylation of the substrates **1h**−**j** (which were derived from the corresponding bidentate ligands, Scheme 2) using the $Pd(OAc)_2$/AgOAc-catalytic system, and the substrates **1h**−**j** failed to afford the corresponding β-arylated products (Scheme 2) under the optimized reaction conditions (entry 2, Table 1) used for the substrate **1e**. Further, we investigated the β-arylation of acrylamide systems **1k** and **1l** (which were derived from 1-naphthylamine and α-methylbenzylamine, respectively). In contrast to the substrate **1e**, the $Pd(OAc)_2$/AgOAc-catalytic system-based arylation of the substrates **1k** and **1l** directly gave the corresponding bis-arylated products **7a** and **8a** instead of any of the corresponding mono-β-arylated products (**7b** or **8b**, Scheme 2). The Pd-catalyzed arylation of the substrate **1k** with 2 or 4 equiv of 4-iodoanisole gave the bis-arylated product **7a** in 17% and 49% yields (Scheme 2). Similarly, the Pd-catalyzed arylation of the

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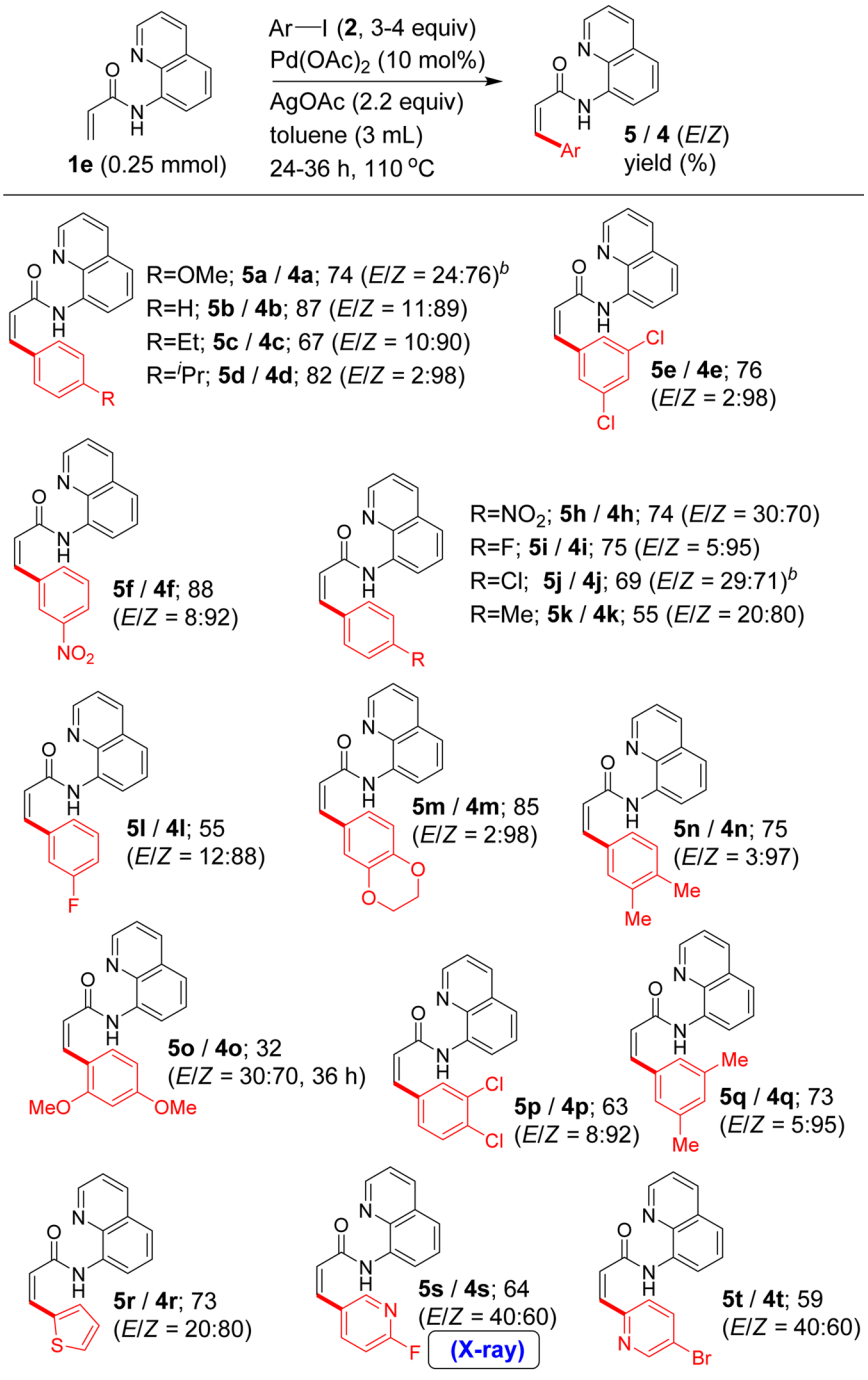
Table 2. Generality of the Pd(II)-Catalyzed *Z* Selective Mono-*β*-arylation of 1e with Various Aryl Iodides[a]



[a]The *E*/*Z* ratios of diastereomers were determined from the NMR spectra of the crude reaction mixtures. [b]In this case, 3 equiv of aryl iodide was used.

substrate **1l** with 4 equiv of 4-iodoanisole gave the bis-arylated product **8a** in 52% yield (Scheme 2).

In an optimization of reaction conditions (entry 4, Table 1), the Pd-catalyzed C(*β*)−H arylation of the substrate **1e** with iodobenzene (**2b**) in the presence of K_2CO_3 as an additive in toluene furnished the products **5b**/**4b** (*E*/*Z* isomers) with *E*/*Z* ratio 59:41. With an intention to alter the *E*/*Z* ratio, we examined the reaction of the substrate **1e** with iodobenzene (**2b**) in the presence of K_2CO_3 as an additive in *tert*-amyl alcohol, which afforded the product **5b** (*E* isomer) as the major isomer having the thermodynamically preferred *E* stereochemistry in 80% yield (**5b**/**4b** = *E*/*Z* = 92:8, Scheme 3). Along this line, the Pd-catalyzed C−H arylation of the substrate **1e** with various aryl iodides in the presence of K_2CO_3 in *tert*-amyl alcohol also gave the corresponding products **5a**, **5c**−**g**, and **9** (*E* isomers) as the major isomers having the thermodynamically preferred *E* stereochemistry (Scheme 3).

Next, the generality of this protocol comprising the $Pd(OAc)_2$-catalyzed, AgOAc-mediated *Z* selective *β*-arylation of *N*-(quinolin-8-yl)acrylamide (**1e**) was expanded by performing the C−H arylation of the substrate **1e** with a variety of aryl iodides (Table 2). The $Pd(OAc)_2$/AgOAc-catalytic

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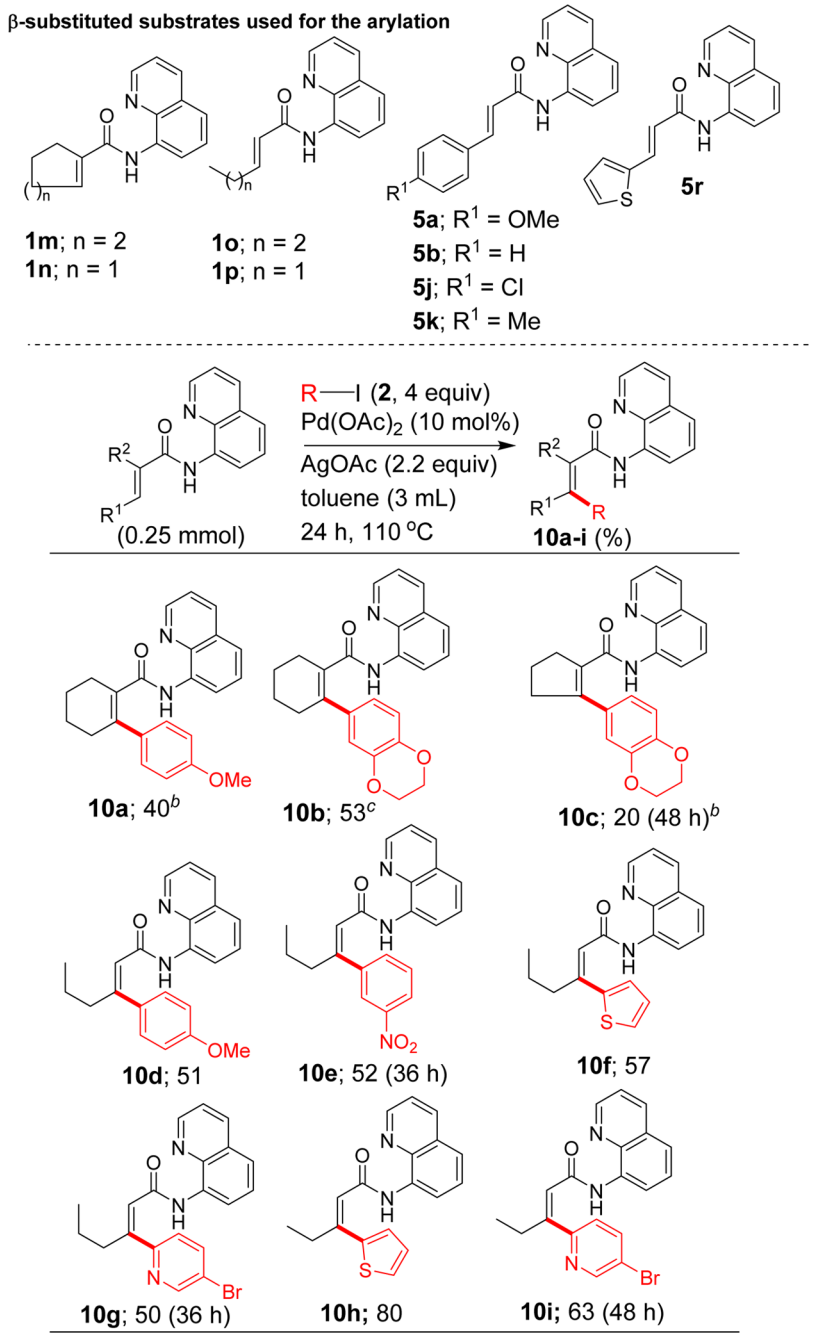
Table 3. Construction of the *β*-Arylated Carboxamides 10a–i[a]



[a]The compounds **10a** and **10b** were obtained from the substrate **1m**. The compound **10c** was obtained from the substrate **1n**. The compounds **10d–g** were obtained from the substrate **1o**. The compounds **10h,i** were obtained from the substrate **1p**. [b]In this case, 2 equiv of the corresponding aryl iodide was used. [c]In this case, 4 equiv of the corresponding aryl iodide was used.

system-based direct *β*-arylation of *N*-(quinolin-8-yl)acrylamide (**1e**) with aryl iodides containing a substituent at the *para* or *meta* position (e.g., alkyl, OMe, F, Cl, and NO_2) successfully afforded the corresponding mono-*β*-arylated acrylamides **5a–f**/**4a–f** and **5h–q**/**4h–q** (*E*/*Z* isomers) in 32–88% yields with an *E*/*Z* ratio up to 2:98. We also performed the Pd-catalyzed *β*-arylation of *N*-(quinolin-8-yl)acrylamide (**1e**) with a variety of heteroaryl iodides, which gave the corresponding products **5r–t**/**4r–t** (*E*/*Z* isomers) in 59–73% yields with an *E*/*Z* ratio up to 20:80. In general, the *β*-arylated acrylamides **5**/**4** (*E*/*Z* isomers) were obtained in good to very good yields and good to high *E*/*Z* ratios. Specifically, the low or moderate yield and *E*/*Z* ratio of the products **5o**/**4o**, **5s**/**4s**, and **5t**/**4t** (*E*/*Z* isomers) may be related to the reactivity pattern of the corresponding aryl iodides. Although a precise reason is not clear for this, it is assumed that the corresponding aryl iodides have strong coordinating moieties (e.g., 1-idodo-2,4-dimethoxybenzene contains an *ortho* methoxy group, and 2-fluoro-5-iodopyridine and 5-bromo-2-iodopyridine are pyridine-based aryl iodides), which might be disturbing the Pd-catalyzed reaction course. The *E* stereochemistry of the minor isomers **5** and the *Z* stereochemistry of the major isomers **4** (Scheme 3 and Table 2) were ascertained based on the observed characteristic coupling constant values of the corresponding

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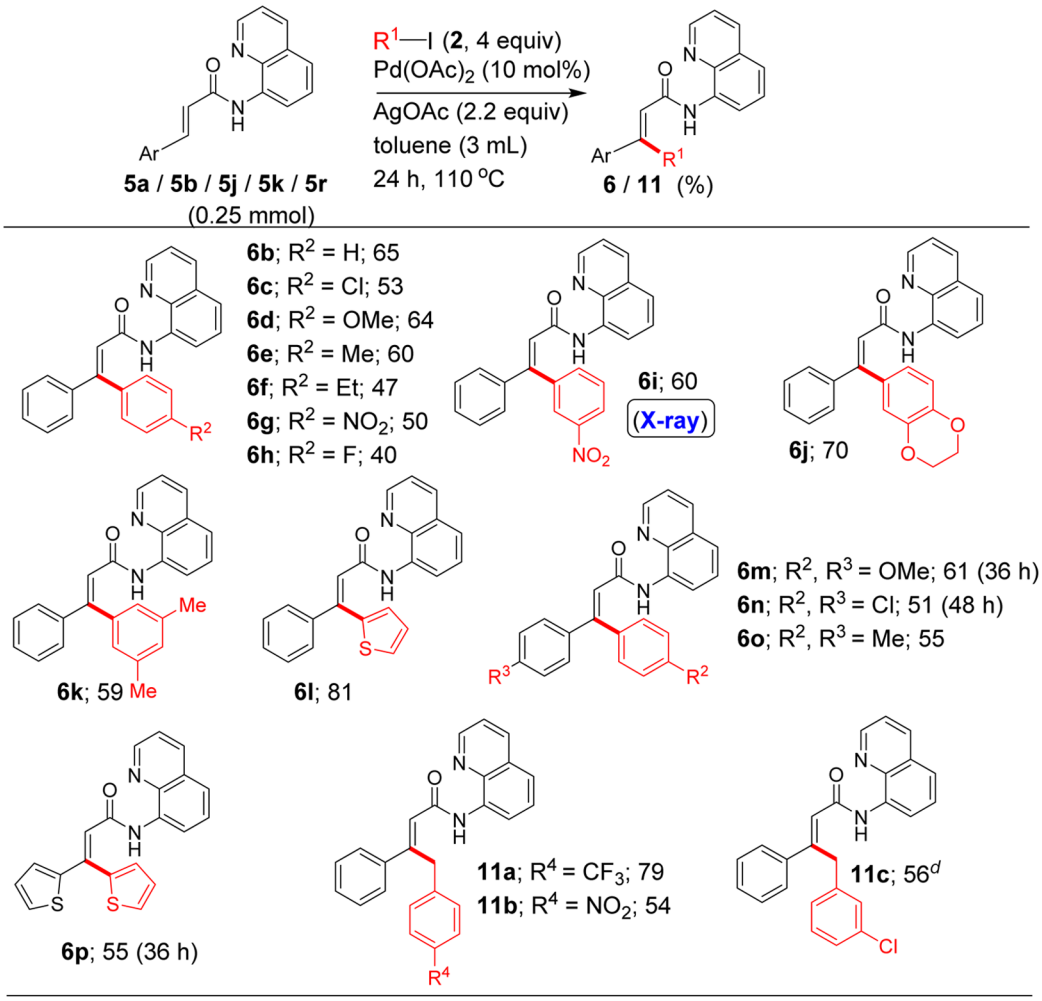
Table 4. Construction of the β-Arylated Carboxamides 6 and 11[a]



[a]The compounds **6b–l** were obtained from the substrate **5b**. The compounds **6m**, **6n**, **6o**, and **6p** were obtained from the corresponding starting compounds **5a**, **5j**, **5k**, and **5r**. The compounds **11a–c** were obtained from the reaction of the substrate **5b** with the corresponding benzyl bromides.

doublet peaks of the olefin protons (J = ~ 12.5 Hz for the Z isomer (**4a–f** and **4h–t**) and J = ~ 15.5 Hz for the E isomer (**5a–t**)) and the X-ray structure of the representative Z isomer **4s**.

Then, we envisioned to extend the substrate scope of this method dealing with the $Pd(OAc)_2$-catalyzed, AgOAc-mediated Z selective β-arylation of *N*-(quinolin-8-yl)acrylamide. In this regard, we planned to use various acrylamide substrates (as shown in Table 3), such as cyclic carboxamides **1m** and **1n**; β-alkylated compounds **1o** and **1p** having the E stereochemistry; and mono-β-arylated acrylamide systems **5a**, **5b**, **5j**, **5k**, and **5r** having the E stereochemistry. Initially, we carried out the Pd-catalyzed β-arylation of the cyclic carboxamides **1m** and **1n**, which gave the corresponding sp^2 C(β)–H bond arylated cyclic carboxamides **10a–c** in 20–53% yields (Table 3). Next, we performed the Pd-catalyzed β-arylation of the β-alkylated compound **1o** having the E stereochemistry with various iodobenzenes, which successfully gave the corresponding β-alkylated β′-arylated acrylamides **10d–g** in 50–57% yields. Along this line, the Pd-catalyzed β-arylation of the β-alkylated compound **1p** having the E stereochemistry also gave the corresponding β-alkylated β′-arylated acrylamides **10h** and **10i** in 80% and 63% yields, respectively (Table 3).

Successively, we were interested to perform the second arylation of the C(β)–H bond of the mono-β-arylated acrylamide system **5** having the E stereochemistry (e.g., **5a**, **5b**, **5j**, **5k**, and **5r**) via the $Pd(OAc)_2$-catalyzed, AgOAc-mediated and bidentate ligand 8-aminoquinoline-directed C–H activation approach (Table 4). Accordingly, we carried out the Pd-catalyzed Z selective C(β)–H activation, followed by arylation of the mono-β-arylated acrylamide **5b** having the E stereochemistry with several aryl- and heteroaryl iodides, which successfully afforded the corresponding β,β′-diarylated acrylamides **6b–l** in 40–81% yields (Table 4). Along this line, the Pd-catalyzed Z selective C–H functionalization of other mono-β-arylated acrylamide systems **5a**, **5j**, **5k**, and **5r** (E isomers) with various aryl- and heteroaryl iodides gave the corresponding β,β′-diarylated acrylamides **6m–p** in 51–61% yields (Table 4). Next, we carried out the benzylation of the substrate **5b** using benzyl bromides in the presence of $Pd(OAc)_2$ catalyst, which successfully furnished the corresponding benzylated acrylamides **11a–c** in 54–79% yields (Table 4). The stereochemistry of the products **6c–l** and **11a–c** were assigned based on the X-ray structure of the representative compound **6i**. The X-ray structure of the representative compound **6i** confirmed that the Pd-catalyzed C–H arylation of the substrate **5b** having the E stereochemistry was stereoselective and the stereochemistry of the phenyl group in

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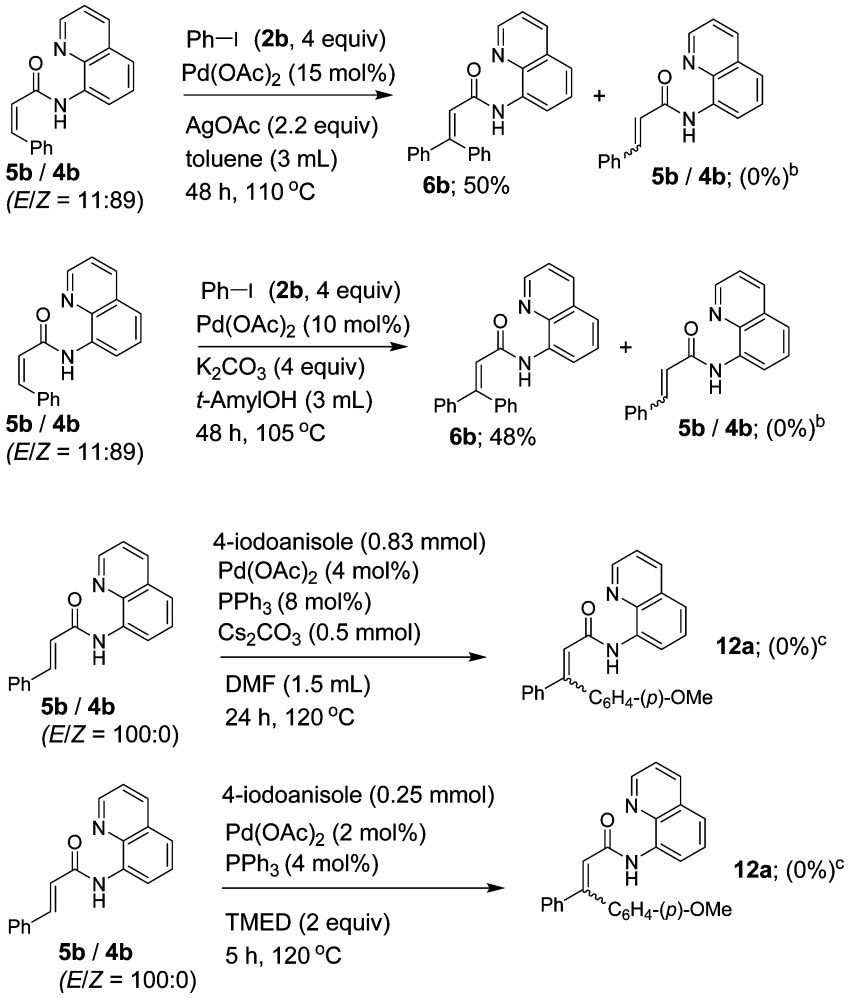
Scheme 4. Pd-Catalyzed β-Arylation of 5b/4b[a]



[a]All the reactions were carried out using 0.25 mmol of **5b**/**4b** (E/Z isomers, E/Z ratio 11:89). [b]The crude NMR spectra revealed the presence of only traces of **5b**/**4b** apart from the product **6b**. [c]The crude NMR spectra revealed the recovery of the starting material **5b**, and the Heck product **12a** was not detected.

the product **6i** was found to be unchanged with respect to the carboxamide group of the mono-β-arylated acrylamide **5b**.

Thenceforward, we wished to perform the Pd(II)-catalyzed second β-arylation of the mono-β-arylated acrylamide compound mixture **5b**/**4b** (E/Z isomers, E/Z ratio 11:89), in which the Z isomer is the major compound. Accordingly, the $Pd(OAc)_2$-catalyzed, AgOAc-promoted β-arylation of **5b**/**4b** (E/Z isomers, E/Z ratio 11:89) with iodobenzene (**2b**) furnished the β,β'-diarylated acrylamide **6b** in 50% yield (Scheme 4). Similarly, the β-arylation of **5b**/**4b** (E/Z isomers, E/Z ratio 11:89) with iodobenzene (**2b**) in the presence of the $Pd(OAc)_2$ catalyst and K_2CO_3 as an additive also gave the β,β'-diarylated acrylamide **6b** in 48% yield. In these cases, the product **6b** was obtained in moderate yield and we did not isolate any other characterizable side product from the column chromatography purification. We expected that these reactions will either not proceed or give very low yield of **6b** with recovery of the E isomer **5b**; however, the product **6b** was obtained in moderate yields (48% and 50%, respectively, Scheme 4), which indicated that we cannot ignore the occurrence of E/Z isomerization under the experimental conditions (see Table S1 and Scheme S2 of the Supporting Information for some other trial reactions involving E/Z isomerization under the experimental conditions and the arylation of **5b**/**4b** (E/Z isomers) with iodoanisole instead of **2b**). When compared to the results of Table 4, notably, the β-arylation of the mono-β-arylated acrylamide compound **5b** (having the E geometry) containing the directing group under the conventional Mizoroki–Heck reaction conditions failed to afford the corresponding β,β'-diarylated acrylamide **12a** (Scheme 4).

In the Pd-catalyzed Mizoroki–Heck reactions of acrylic acid based substrates with a suitable coupling partner, generally, the corresponding β-arylated acrylic acid derivatives having the E stereochemistry were obtained as the major isomers. The exclusive or predominant formation of the β-arylated acrylic acid derivatives having the Z stereochemistry under the traditional Pd-catalyzed Mizoroki–Heck reaction conditions is infrequently observed.[9−11,13−18]

In the present work, the $Pd(OAc)_2$-catalyzed, AgOAc-promoted bidentate ligand 8-aminoquinoline-directed β-arylation of *N*-(quinolin-8-yl)acrylamide system **1e** was found to be stereoselective and afforded the mono-β-arylated acrylamides **4a−f** and **4h−t** having the Z stereochemistry as the predominant isomers (Tables 1 and 2). Similarly, based on the results of Table 4, the β-arylation of *N*-(quinolin-8-yl)acrylamide system **5b** having the E stereochemistry was stereoselective and the

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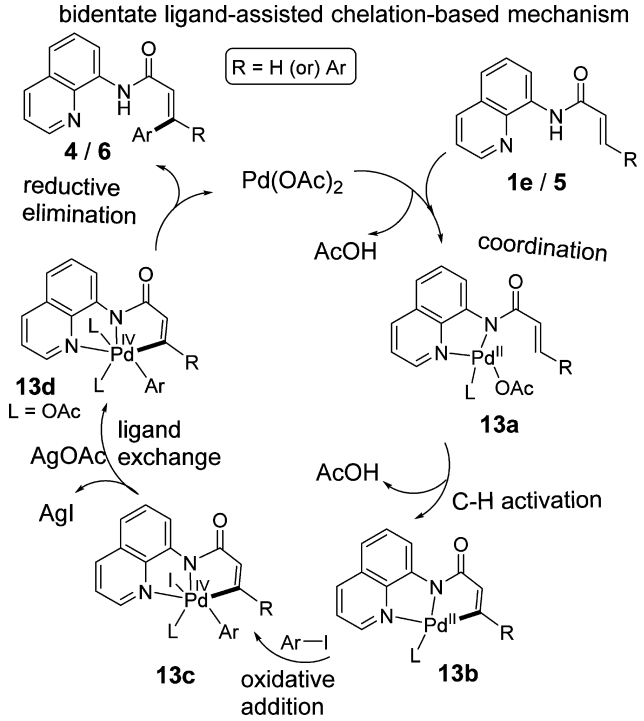
stereochemistry of the phenyl group in the X-ray structure of the representative product **6i** was found to be unchanged with respect to the carboxamide group of **5b**. The observed *Z* selective *β*-arylation of *N*-(quinolin-8-yl)acrylamide systems **1e** and **5b** linked with the bidentate ligand 8-aminoquinoline can be envisaged via the plausible chelation-based reaction pathway in concurrence with the generally accepted proposed Pd(II/IV) catalytic cycle mechanism[1−3,13] pertaining to the $Pd(OAc)_2$/AgOAc-catalytic system-based C−H activation of carboxamides aided by the bidentate ligand (Scheme 5). The mechanism for

Scheme 5. Plausible Mechanism for the Z Selective C−H Arylation of 1e and 5



the bidentate directing group-aided $Pd(OAc)_2$/AgOAc-catalytic system-based C−H activation proposed to involve the following steps:[13] (a) An initial coordination of the directing group to the Pd(II) catalyst, followed by the activation of the C(*β*)−H bond, generates the Pd(II) species **13b**. (b) Next, in the oxidative addition step, oxidation of the Pd(II) species **13b** produces the Pd(IV) species **13c** in the presence of an aryl iodide. (c) Next, AgOAc helps in the ligand exchange step to generate the Pd(IV) species **13d**, and finally, the reductive elimination of the Pd(IV) species **13d** yields the desired product **4**/**6** along with the regeneration of the Pd(II) catalyst for the next cycle. It is also worth to mention here that the Ni- or Fe-catalyzed bidentate ligand-assisted Z selective C−H arylation of the acrylamide system was also proposed to occur involving a similar type of chelation-based C−H functionalization mechanism.[14,15]

Additionally, to support the role of the bidentate ligand, 8-aminoquinoline and proposed Pd-catalyzed, AgOAc-mediated chelation-based C−H functionalization mechanism[13] (Scheme 5), we carried out some control reactions by using the substrates **14a** and **14b**. Unlike the substrate **1e** (which is linked with the bidentate ligand 8-aminoquinoline), which gave the mono-*β*-arylated acrylamides **4a−f** and **4h−t** having the *Z* stereochemistry as the predominant isomers, the C−H arylation of the substrates **14a** and **14b** (under the similar reaction conditions used for the C−H arylation of the substrate **1e**) in the presence of the $Pd(OAc)_2$ catalyst and AgOAc as an additive furnished the corresponding mono-*β*-arylated acrylamides **15a** and **15b** having the *E* stereochemistry as the predominant isomers (Scheme 6), plausibly, via the ligand-free Mizoroki−Heck reaction mechanism.[16]

Furthermore, from the reactions shown in Scheme 3, it is also known that the $Pd(OAc)_2$-catalyzed *β*-arylation of the substrate **1e** (which is linked with the bidentate ligand 8-aminoquinoline) and the substrate **1l** (which is not linked with the bidentate ligand 8-aminoquinoline) in the presence of K_2CO_3 instead of AgOAc in *tert*-amyl alcohol[17] afforded the corresponding *β*-arylated acrylamides **5a−g** and **9** having the *E* stereochemistry as the predominant isomers, plausibly, via the ligand-free Mizoroki−Heck reaction mechanism suggested by Yao[18] (Scheme 6). Moreover, from the reactions shown in Scheme 4, the *β*-arylation of the mono-*β*-arylated acrylamide compound **5b** (which is linked with the bidentate ligand 8-aminoquinoline) under the conventional Mizoroki−Heck reaction conditions failed to afford the product **12a**. From the above deliberations, it is proposed that the observed *Z* selective *β*-arylation of *N*-(quinolin-8-yl)acrylamide systems **1e** and **5b** (which are linked with the bidentate ligand 8-aminoquinoline) is apparently governed by the $Pd(OAc)_2$/AgOAc-catalytic system and the bidentate ligand 8-aminoquinoline, which can be comprehended via the plausible chelation-based C−H activation reaction pathway (as shown in Scheme 5) rather than via the Heck-type reaction mechanism.

Finally, we carried out the Pd(II)-catalyzed *β*-arylation of acrylamide **1e** with iodobenzene (**2b**) on a gram scale, which furnished the products **5b**/**4b** in 62% yield (*E*/*Z* ratio 20:80, Scheme 7). Then, we planned to remove the bidentate ligand (8-aminoquinoline) from the representative *β*-arylated acrylamide systems **5b**/**4b** (*E*/*Z* isomers, *E*/*Z* ratio 11:89) and **6b**. Accordingly, the TfOH-mediated hydrolysis[12d,e] of the representative carboxamides **5b**/**4b** (*E*/*Z* isomers, *E*/*Z* ratio 11:89) at 100 °C afforded the thermodynamically preferred *E*-cinnamic acid **16a** instead of the *Z*-cinnamic acid under the experimental conditions. Similarly, the TfOH-mediated hydrolysis of the carboxamide **6b** afforded the carboxylic acid **16b** in 53% yield (Scheme 7). We also tried the removal of the bidentate ligand (8-aminoquinoline) from the *β*-arylated acrylamides **5b**/**4b** (*E*/*Z* isomers, *E*/*Z* ratio 11:89) using a variety of other amide hydrolysis reaction conditions to get the Z-cinnamic acid; however, our efforts to get the Z-cinnamic acid from the *β*-arylated acrylamides **5b**/**4b** (*E*/*Z* isomers, *E*/*Z* ratio 11:89) were not fruitful (see the Supporting Information for the additional reactions tried in this regard). Notably, a survey of the literature works[1−3,12] revealed that the removal of the bidentate ligand (8-aminoquinoline) from carboxamides after the C−H functionalization reaction needs to be carried out by using relatively strong acidic or basic reaction conditions and under heating conditions. In concurrence with the literature reports dealing with the *cis*−*trans* isomerization of cinnamic acid under thermal conditions[19−21] and considering the reaction conditions worked (Scheme 7) to remove the bidentate ligand (8-aminoquinoline), the *cis*−*trans* isomerization was unavoidable in the present work. However, we will continue to find out a suitable condition for removing of the bidentate ligand (8-aminoquinoline) from the *β*-arylated acrylamides **5b**/**4b** (*E*/*Z* isomers, *E*/*Z* ratio 11:89) to get the Z-cinnamic acid.

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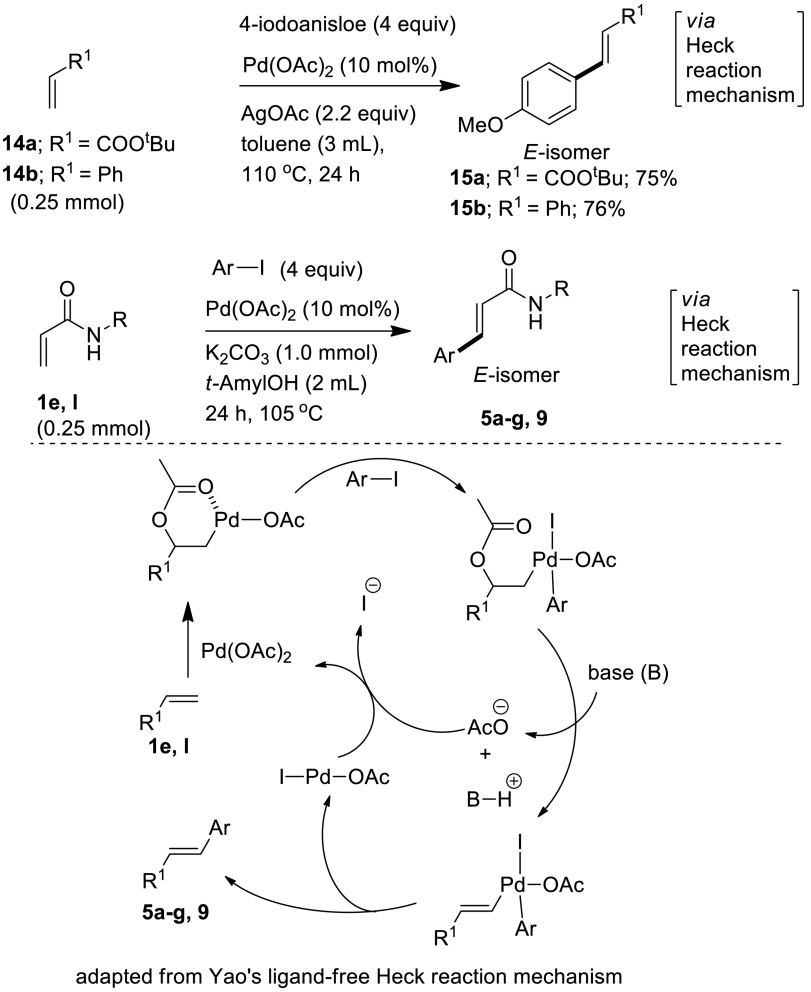
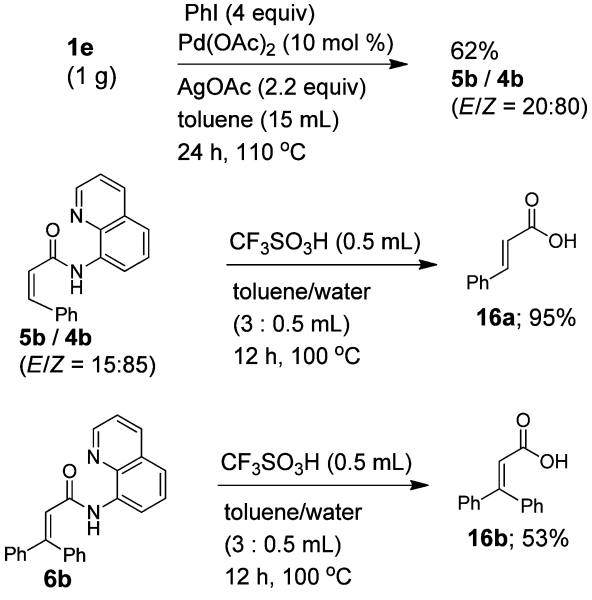
Scheme 6. Mizoroki–Heck-Type β-Arylation of 14a,b and 1e,l under the $Pd(OAc)_2$/AgOAc and $Pd(OAc)_2/K_2CO_3$ Systems, Respectively[a]



[a]See ref 18a.

Scheme 7. Gram-Scale Reaction and Ligand Removal[a]



[a]All the amide hydrolysis reactions were carried out using 0.25 mmol of substrates.

CONCLUSION

In summary, we have shown a contemporary method comprising $Pd(OAc)_2$-catalyzed, AgOAc-promoted and bidentate ligand-directed *Z* selective C–H activation, followed by the arylation of the C(β)–H bond of *N*-(quinolin-8-yl)acrylamide systems with aryl- and heteroaryl iodides. This method provided an easy access to mono-*Z*-cinnamamide derivatives and β,β-diarylated acrylamides. The observed *Z* selective β-arylation of *N*-(quinolin-8-yl)acrylamide systems was explicated via a plausible chelation-based C–H activation reaction pathway.

EXPERIMENTAL SECTION

General. Melting points are uncorrected. IR spectra of compounds were recorded as thin films or KBr pellets. ^1H and $^{13}C\{^1H\}$ NMR spectra of compounds were recorded on 400 and 100 MHz spectrometers, respectively. HRMS measurements were obtained from a TOF mass analyzer using electrospray ionization (ESI). Column chromatography was carried out using silica gel 100–200 mesh. Reactions were performed in anhydrous solvent under a nitrogen atmosphere. Isolated yields of all the compounds were reported, and yields were not optimized. Amides (starting materials) used in the Pd-catalyzed C–H arylation reactions were prepared (from their corresponding acid chlorides and amines) by using the standard literature procedures. The Heck-type reactions involving the formation of **11b** shown in Scheme 4 were performed by using the standard

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literature procedures. The *E*/*Z* ratios of diastereomers (*E*/*Z* isomers) were determined from the NMR spectra of the crude reaction mixtures. In the cases of Tables 1 and 2 and Schemes 3 and 6, the total isolated yields of diastereomers (*E*/*Z* isomers) were reported. In general, the *E*/*Z* isomers are separable, and the following points are with regard to Tables 1 and 2 and Scheme 3: After the Pd(II)-catalyzed mono-C−H arylation of the corresponding acrylamide systems, the purification of the crude reaction mixture afforded the respective diastereomers (*E*/*Z* isomers) as a mixture since the corresponding diastereomers (*E*/*Z* isomers) had similar R_f values. Then, the respective diastereomers (*E*/*Z* isomers) were again subjected to the column chromatographic purification to get the pure major and minor isomers. In most of the cases, the purification of the crude reaction mixtures gave only the major diastereomers in pure form and the corresponding minor isomers could not be completely separated from their respective major isomers. Additionally (except the reactions that gave very high *E*/*Z* ratio), the complete isolation of the corresponding major diastereomers also was not possible and only a few fractions of the corresponding major diastereomers were obtained, which were used to characterize the corresponding major isomers. In some cases, the major diastereomers were isolated with traces of the corresponding minor diastereomers. Compounds **1e**,[10e,f] **1i**,[22b] **1j**,[22c] **1k**,[22e] **1l**,[22a] **1m**,[10f] **1n**,[10b] **5b**,[10f] **4a**,[10e] **16a** (commercial chemical), **16b**,[22d] **15a**,[23a] and **15b**[23b] are reported in the literature.

General Procedure for the *β*-Arylation of Acrylamides and Preparation of 5a−f/5h−t/4a−f/4h−t/6b−p/7a/8a/10a−i/11a−c/15a,b Using the $Pd(OAc)_2$ and AgOAc Catalytic System. An appropriate acrylamide (1.0 equiv, 0.25 mmol), $Pd(OAc)_2$ (5−15 mol %, 2.8−8.4 mg, 0.0125−0.0375 mmol), an appropriate aryl iodide (4.0 equiv, 1.0 mmol), and AgOAc (91.8 mg, 0.55 mmol) in anhydrous toluene (3 mL) were heated at 110 °C for 24−48 h under a nitrogen atmosphere. After the reaction period, the reaction mixture was concentrated in vacuum, and purification of the resulting reaction mixture through column chromatography furnished the corresponding arylated acrylamides **5a−f/5h−t/4a−f/4h−t/6b−p/7a/8a/10a−i/11a−c/15a,b** (see the respective tables/schemes for specific examples).

General Procedure for the Preparation of 5a−g/4a−g/6b/9 Using the $Pd(OAc)_2$ and K_2CO_3 Catalytic System. An appropriate acrylamide (1.0 equiv, 0.25 mmol), $Pd(OAc)_2$ (10 mol %, 5.6 mg, 0.025 mmol), an appropriate aryl iodide (4.0 equiv, 1.0 mmol), and K_2CO_3 (4.0 equiv, 138.2 mg, 1 mmol) in anhydrous *t*-AmylOH (2 mL) were heated at 105 °C, for 24 h under a nitrogen atmosphere. After the reaction period, the reaction mixture was concentrated in vacuum, and purification of the resulting reaction mixture by column chromatography furnished the corresponding arylated acrylamides **5a−g/4a−g/6b/9** (see the respective tables/schemes for specific examples).

*N-(2-Methylquinolin-8-yl)acrylamide (**1h**).* Compound **1h** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored liquid; Yield: 75% (159 mg); IR (DCM): 3338, 1713, 1529, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.92 (br. s, 1H), 8.78 (dd, 1H, J_1 = 7.3 Hz, J_2 = 1.6 Hz), 7.87 (d, 1H, J = 8.4 Hz), 7.40−7.32 (m, 2H), 7.17 (d, 1H, J = 8.4 Hz), 6.52−6.41 (m, 2H), 5.77 (dd, 1H, J_1 = 8.6 Hz, J_2 = 2.9 Hz), 2.64 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.5, 157.2, 137.6, 136.3, 133.6, 131.9, 127.2, 126.1, 125.9, 122.4, 121.6, 116.6, 25.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{13}H_{13}N_2O$: 213.1028; found 213.1025.

*(E)-N-(Quinolin-8-yl)hex-2-enamide (**1o**).* Compound **1o** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a brown-colored liquid; Yield: 54% (130 mg); IR (DCM): 3351, 1682, 1530, 1486, 1385, 791 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.85 (br. s, 1H), 8.87 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.5 Hz), 8.81 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.16 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.56 (t, 1H, J = 8.2 Hz), 7.50 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.5 Hz), 7.45 (dd, 1H, J_1 = 8.3 Hz, J_2 = 2.5 Hz), 7.08 (td, 1H, J_1 = 15.2 Hz, J_2 = 7.0 Hz), 6.19 (td, 1H, J_1 = 15.2 Hz, J_2 = 1.5 Hz), 2.28 (dq, 2H, J_1 = 7.2 Hz, J_2 = 1.5 Hz), 1.60−1.52 (m, 2H), 0.99 (t, 3H, J = 7.3 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 148.1, 146.2, 138.4, 136.4, 134.7, 127.9, 127.5, 124.7, 121.6, 121.5, 116.7, 34.2, 21.5, 13.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{15}H_{17}N_2O$: 241.1341; found 241.1334.

*(E)-N-(Quinolin-8-yl)pent-2-enamide (**1p**).* Compound **1p** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a yellow-colored liquid; Yield: 57% (130 mg); IR (DCM): 3350, 1684, 1527, 1485, 1327, 971 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.85 (br. s, 1H), 8.86 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.4 Hz), 8.81 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.15 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.55 (t, 1H, J = 8.1 Hz), 7.49 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.4 Hz), 7.44 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.13 (td, 1H, J_1 = 15.2 Hz, J_2 = 6.4 Hz), 6.19 (td, 1H, J_1 = 15.2 Hz, J_2 = 1.7 Hz), 2.36−2.29 (m, 2H), 1.50 (t, 3H, J = 7.4 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 148.1, 147.6, 138.4, 136.4, 134.7, 127.9, 127.5, 123.7, 121.6, 121.4, 116.7, 25.3, 12.5; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{14}H_{15}N_2O$: 227.1184; found 227.1180.

*(Z)-3-(4-Methoxyphenyl)-N-(quinolin-8-yl)acrylamide (**4a**).*[10e] Compound **4a** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 27:73) as a brown-colored liquid; Yield: 74% (56 mg), (*E*:*Z* = 24:76); IR (DCM): 3412, 1713, 1362, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.88 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.3 Hz), 8.68 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.15 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.69 (d, 2H, J = 8.9 Hz), 7.57 (t, 1H, J = 8.2 Hz), 7.52 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.5 Hz), 7.43 (dd, 1H, J_1 = 8.4 Hz, J_2 = 4.2 Hz), 6.90 (d, 1H, J = 12.5 Hz) 6.87 (d, 2H, J = 8.9 Hz), 6.18 (d, 1H, J = 12.5 Hz), 3.80 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.2, 160.2, 148.0, 139.3, 138.4, 136.2, 134.6, 131.6, 127.9, 127.5, 127.4, 122.3, 121.5, 121.5, 116.6, 113.7, 55.3; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{17}N_2O_2$: 305.1290; found 305.1280.

*(E)-3-(4-Methoxyphenyl)-N-(quinolin-8-yl)acrylamide (**5a**).* Compound **5a** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 57% (44 mg), (*E*:*Z* = 95:5); mp 116−118 °C; IR (KBr): 2922, 1602, 1525, 1381, 1033 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.99 (br. s, 1H), 8.93 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.4 Hz), 8.85 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.20 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.80 (d, 1H, J = 15.5 Hz), 7.62−7.58 (m, 3H), 7.54 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.49 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 6.95 (d, 2H, J = 8.3 Hz), 6.70 (d, 1H, J = 15.5 Hz), 3.87 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.6, 161.1, 148.1, 141.8, 138.5, 136.5, 134.8, 129.7, 128.0, 127.5, 121.7, 121.5, 119.1, 116.8, 114.3, 55.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{17}N_2O_2$: 305.1290; found 305.1277.

*(Z)-3-Phenyl-N-(quinolin-8-yl)acrylamide (**4b**).*[10f] Compound **4b** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 25:75) as a brown-colored liquid; Yield: 87% (59 mg), (*E*:*Z* = 11:89); IR (DCM): 3342, 176, 1523, 1484, 790 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.92 (br. s, 1H), 8.86 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 8.62 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.14 (dd, 1H, J_1 = 8.1 Hz, J_2 = 1.6 Hz), 7.64−7.62 (m, 2H), 7.56 (t, 1H, J = 8.1 Hz), 7.51 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.41 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.35−7.28 (m, 3H), 7.01 (d, 1H, J = 12.5 Hz), 6.30 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.9, 148.0, 139.0, 138.4, 136.2, 135.0, 134.4, 129.4, 128.7, 128.3, 127.9, 127.4, 124.7, 121.6, 121.5, 116.6; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{15}N_2O$: 275.1184; found 275.1171.

*N-(Quinolin-8-yl)cinnamamide (**5b**).*[10f] Compound **5b** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a pale yellow-colored solid; Yield: 80% (55 mg), (*E*:*Z* = 92:8); mp 117−119 °C; IR (KBr): 3346, 1629, 1526, 1259, 825 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.04 (br. s, 1H), 8.94 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.4 Hz), 8.86 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.20 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.85 (d, 1H, J = 15.5 Hz), 7.65−7.63 (m, 2H), 7.59 (t, 1H, J = 7.6 Hz), 7.55 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.5 Hz), 7.50 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.46−7.41 (m, 3H), 6.83 (d, 1H, J = 15.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.2, 148.2, 142.1, 138.5, 136.5, 134.8, 134.6, 129.9, 128.9, 128.1, 128.0, 127.5, 121.7, 121.5, 116.9; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{15}N_2O$: 275.1184; found 275.1170.

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*(Z)-3-(4-Ethylphenyl)-N-(quinolin-8-yl)acrylamide (**4c**).* Compound **4c** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a brown-colored liquid; Yield: 67% (50 mg), (*E*:*Z* = 10:90); IR (DCM): 3344, 1713, 1363, 1270, 530 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.88 (dd, 1H, J_1 = 7.5 Hz, J_2 = 0.96 Hz), 8.64 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.59 (d, 2H, J = 8.1 Hz), 7.55 (d, 1H, J = 7.7 Hz), 7.51 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.4 Hz), 7.40 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.16 (d, 2H, J = 8.1 Hz), 6.96 (d, 1H, J = 12.5 Hz), 6.25 (d, 1H, J = 12.5 Hz), 2.63 (q, 2H, J = 7.2 Hz), 1.20 (t, 3H, J = 7.6 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.1, 147.9, 145.2, 139.3, 138.4, 136.2, 134.5, 132.3, 129.7, 127.9, 127.8, 127.4, 123.7, 121.6, 121.5, 116.6, 28.7, 15.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{20}H_{19}N_2O$: 303.1497; found 303.1488.

*(E)-3-(4-Ethylphenyl)-N-(quinolin-8-yl)acrylamide (**5c**).* Compound **5c** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a colorless solid; Yield: 73% (55 mg), (*E*:*Z* = 95:5); mp 125−127 °C; IR (KBr): 3348, 1675, 1526, 1485, 825 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.02 (br. s, 1H), 8.94 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.4 Hz), 8.86 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.20 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.84 (d, 1H, J = 15.6 Hz), 7.62−7.53 (m, 4H), 7.49 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.27 (d, 2H, J = 8.1 Hz), 6.80 (d, 1H, J = 15.6 Hz), 2.71 (q, 2H, J = 7.6 Hz), 1.29 (t, 3H, J = 7.6 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 148.1, 146.6, 142.1, 138.5, 136.5, 134.7, 132.3, 128.4, 128.2, 128.0, 127.5, 121.7, 121.6, 120.5, 116.8, 28.8, 15.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{20}H_{19}N_2O$: 303.1497; found 303.1488.

*(Z)-3-(4-Isopropylphenyl)-N-(quinolin-8-yl)acrylamide (**4d**).* Compound **4d** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a colorless liquid; Yield: 82% (65 mg), (*E*/*Z* = 2:98); IR (DCM): 3345, 1675, 1524, 1484, 890 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.87 (dd, 1H, J_1 = 7.5 Hz, J_2 = 0.96 Hz), 8.63 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.60 (d, 2H, J = 8.2 Hz), 7.55 (d, 1H, J = 7.7 Hz), 7.51 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.40 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.19 (d, 2H, J = 8.2 Hz), 6.96 (d, 1H, J = 12.5 Hz), 6.24 (d, 1H, J = 12.5 Hz), 2.91−2.84 (m, 1H), 1.21 (d, 6H, J = 6.9 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.1, 149.8, 147.9, 139.2, 138.4, 136.2, 134.5, 132.4, 129.7, 127.9, 127.4, 126.4, 123.7, 121.5, 121.5, 116.5, 34.0, 23.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{21}H_{21}N_2O$: 317.1654; found 317.1657.

*(E)-3-(4-Isopropylphenyl)-N-(quinolin-8-yl)acrylamide (**5d**).* Compound **5d** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a colorless solid; Yield: 82% (65 mg), (*E*/*Z* = 95:5); mp 136−138 °C; IR (KBr): 3278, 1655, 1618, 1544, 763 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.02 (br. s, 1H), 8.95 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.2 Hz), 8.85 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.18 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.84 (d, 1H, J = 15.5 Hz), 7.61−7.56 (m, 3H), 7.53 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.2 Hz), 7.48 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.30 (d, 2H, J = 8.3 Hz), 6.79 (d, 1H, J = 15.5 Hz), 3.0−2.93 (m, 1H), 1.30 (d, 6H, J = 6.9 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 151.2, 148.1, 142.2, 138.4, 136.5, 134.7, 132.4, 128.2, 128.0, 127.5, 127.0, 121.7, 121.6, 120.5, 116.8, 34.1, 23.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{21}H_{21}N_2O$: 317.1654; found 317.1662.

*(Z)-3-(3,5-Dichlorophenyl)-N-(quinolin-8-yl)acrylamide (**4e**).* Compound **4e** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a pale yellow-colored solid; Yield: 76% (65 mg), (*E*/*Z* = 2:98); mp 67−69 °C; IR (KBr): 3340, 1676, 1558, 1485, 1329, 790 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.87 (br. s, 1H), 8.79 (dd, 1H, J_1 = 7.0 Hz, J_2 = 2.0 Hz), 8.68 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.56−7.50 (m, 4H), 7.41 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.26−7.25 (m, 1H), 6.83 (d, 1H, J = 12.5 Hz), 6.35 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.6, 148.1, 138.3, 137.9, 136.5, 136.3, 134.8, 134.1, 128.5, 127.9, 127.7, 127.4, 126.9, 122.0, 121.7, 116.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{13}Cl_2N_2O$: 343.0405; found 343.0403.

*(E)-3-(3,5-Dichlorophenyl)-N-(quinolin-8-yl)acrylamide (**5e**).* Compound **5e** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 56% (48 mg), (*E*:*Z* = 95:5); mp 148−150 °C; IR (KBr): 2922, 1738, 1357, 1217, 786 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.08 (br. s, 1H), 8.90 (dd, 1H, J_1 = 7.2 Hz, J_2 = 1.8 Hz), 8.85 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.21 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.70 (d, 1H, J = 15.5 Hz), 7.62−7.55 (m, 2H), 7.50 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.48 (d, 2H, J = 1.8 Hz), 7.38 (t, 1H, J = 1.8 Hz), 6.83 (d, 1H, J = 15.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.1, 148.3, 139.2, 138.4, 137.8, 136.5, 135.5, 134.3, 129.5, 128.0, 127.5, 126.2, 124.2, 122.1, 121.8, 117.0; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{13}Cl_2N_2O$: 343.0405; found 343.0394.

*(Z)-3-(3-Nitrophenyl)-N-(quinolin-8-yl)acrylamide (**4f**).* Compound **4f** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored solid; Yield: 88% (70 mg), (*E*:*Z* = 8:92); mp 150−152 °C; IR (KBr): 3410, 1713, 1363, 1222, 738 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.95 (br. s, 1H), 8.82 (dd, 1H, J_1 = 6.1 Hz, J_2 = 2.9 Hz), 8.70 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.50 (br. s, 1H), 8.17 (dd, 2H, J_1 = 8.2 Hz, J_2 = 1.7 Hz), 8.02 (d, 1H, J = 7.8 Hz), 7.58−7.53 (m, 2H), 7.50 (t, 1H, J = 8.0 Hz), 7.46 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.02 (d, 1H, J = 12.4 Hz), 6.46 (d, 1H, J = 12.4 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.5, 148.2, 148.1, 138.3, 137.3, 136.6, 136.4, 135.4, 134.0, 129.1, 127.9, 127.4, 126.8, 124.5, 123.3, 122.1, 121.7, 116.9; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}N_3O_3$: 320.1035; found 320.1020.

*(E)-3-(3-Nitrophenyl)-N-(quinolin-8-yl)acrylamide (**5f**).* Compound **5f** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 59% (47 mg), (*E*:*Z* = 95:5); mp 199−201 °C; IR (KBr): 2922, 1677, 1526, 1485, 1350, 1168 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.13 (br. s, 1H), 8.91 (dd, 1H, J_1 = 7.0 Hz, J_2 = 2.0 Hz), 8.87 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.50 (t, 1H, J = 1.8 Hz), 8.26−8.24 (m, 1H), 8.22 (dd, 1H, J_1 = 8.4 Hz, J_2 = 1.8 Hz), 7.91 (s, 1H), 7.87 (d, 1H, J = 15.5 Hz), 7.64−7.57 (m, 3H), 7.52 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 6.96 (d, 1H, J = 15.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.1, 148.7, 148.3, 139.3, 138.4, 136.6, 136.5, 134.3, 134.1, 130.0, 128.0, 127.5, 124.6, 124.2, 122.1, 122.0, 121.8, 117.0; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}N_3O_3$: 320.1035; found 320.1020.

*(E)-3-(3-Methoxyphenyl)-N-(quinolin-8-yl)acrylamide (**5g**).* Compound **5g** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a brown-colored solid; Yield: 53% (41 mg), (*E*:*Z* = 95:5); mp 113−115 °C; IR (KBr): 2922, 1703, 1604, 1513, 1254, 1033 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.04 (br. s, 1H), 8.94 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.4 Hz), 8.87 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.21 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.82 (d, 1H, J = 15.5 Hz), 7.61 (t, 1H, J = 8.2 Hz), 7.56 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.5 Hz), 7.50 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.36 (t, 1H, J = 7.8 Hz), 7.24 (d, 1H, J = 7.6 Hz), 7.16 (t, 1H, J = 2.2 Hz), 6.98−6.96 (m, 1H), 6.82 (d, 1H, J = 15.5 Hz), 3.89 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.1, 159.9, 148.2, 142.1, 138.5, 136.5, 136.2, 134.6, 129.9, 128.0, 127.5, 121.8, 121.7, 121.7, 120.8, 116.9, 115.8, 112.9, 55.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{17}N_2O_2$: 305.1290; found 305.1283.

*(Z)-3-(4-Nitrophenyl)-N-(quinolin-8-yl)acrylamide (**4h**).* Compound **4h** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored solid; Yield: 74% (59 mg), (*E*:*Z* = 30:70); mp 154−156 °C; IR (KBr): 3411, 113, 1421, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.80 (dd, 1H, J_1 = 5.3 Hz, J_2 = 3.7 Hz), 8.68 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.18 (d, 2H, J = 8.6 Hz), 8.17 (dd, 1H, J_1 = 8.1 Hz, J_2 = 1.6 Hz), 7.77 (d, 2H, J = 8.6 Hz), 7.56−7.55 (m, 2H), 7.45 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.03 (d, 1H, J = 12.5 Hz), 6.49 (d, 1H, J = 12.4 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.6, 148.2, 147.5, 141.7, 138.3, 137.2, 136.4, 134.0, 130.2, 127.9, 127.5, 127.4, 123.5, 122.2, 121.8, 116.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}N_3O_3$: 320.1035; found 320.1040.

*(Z)-3-(4-Fluorophenyl)-N-(quinolin-8-yl)acrylamide (**4i**).* Compound **4i** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored solid; Yield: 75% (55 mg), (*E*:*Z* = 5:95); mp 101−103 °C; IR (KBr): 3344, 1673, 1484, 1159, 790 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.93 (br. s, 1H),

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8.85 (dd, 1H, J_1 = 7.2 Hz, J_2 = 1.6 Hz), 8.67 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.15 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.67 (dd, 2H, J_1 = 8.6 Hz, J_2 = 5.5 Hz), 7.56 (t, 1H, J = 8.2 Hz), 7.53 (dd, 1H, J_1 = 5.2 Hz, J_2 = 1.7 Hz), 7.42 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.02 (t, 2H, J = 8.6 Hz), 6.93 (d, 1H, J = 12.5 Hz), 6.27 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.6, 163.0 (d, $J_{C\text{-}F}$ = 247.7 Hz), 148.1, 138.3, 136.3, 134.4, 131.7 (d, $J_{C\text{-}F}$ = 8.5 Hz), 131.0 (d, $J_{C\text{-}F}$ = 3.2 Hz), 127.9, 127.4, 124.3, 121.8, 121.6, 116.6, 115.3 (d, $J_{C\text{-}F}$ = 21.5 Hz); HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}FN_2O$: 293.1090; found 293.1075.

*(Z)-3-(4-Chlorophenyl)-N-(quinolin-8-yl)acrylamide (**4j**).* Compound **4j** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 29:71) as a brown-colored liquid; Yield: 69% (53 mg), (*E*:*Z* = 29:71); IR (DCM): 3441, 1713, 1524, 1363, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.92 (br. s, 1H), 8.83 (dd, 1H, J_1 = 7.1 Hz, J_2 = 1.8 Hz), 8.67 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.16 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.59 (d, 2H, J = 8.5 Hz), 7.56−7.52 (m, 2H), 7.44 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.30 (d, 2H, J = 8.5 Hz), 6.94 (d, 1H, J = 12.5 Hz), 6.31 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.5, 148.1, 138.3, 138.0, 136.3, 134.7, 134.3, 133.4, 130.9, 128.5, 127.9, 127.4, 125.1, 121.8, 121.6, 116.7; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}ClN_2O$: 309.0795; found 309.0779.

*(E)-3-(4-Chlorophenyl)-N-(quinolin-8-yl)acrylamide (**5j**).* Compound **5j** was obtained (from the reaction of 8-aminoquinoline and 4-chlorocinnamoyl chloride) after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 58% (180 mg); mp 172−174 °C; IR (KBr): 3342, 1675, 1528, 1485, 1161 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.03 (br. s, 1H), 8.92 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.1 Hz), 8.85 (dd, 1H, J_1 = 4.1 Hz, J_2 = 1.6 Hz), 8.19 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.78 (d, 1H, J = 15.5 Hz), 7.62−7.59 (m, 1H), 7.58−7.53 (m, 3H), 7.49 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.39 (d, 2H, J = 8.8 Hz), 6.79 (d, 1H, J = 15.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.8, 148.2, 140.7, 138.4, 136.5, 135.7, 134.5, 133.3, 129.2, 129.1, 128.0, 127.5, 122.1, 121.8, 121.7, 116.9; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}ClN_2O$: 309.0795; found 309.0787.

*(Z)-N-(Quinolin-8-yl)-3-(p-tolyl)acrylamide (**4k**).* Compound **4k** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a brown-colored liquid; Yield: 55% (40 mg), (*E*:*Z* = 20:80); IR (DCM): 3411, 1714, 1420, 1363, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.93 (br. s, 1H), 8.87 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 8.65 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.58−7.52 (m, 1 H), 7.55 (d, 2H, J = 7.8 Hz), 7.51 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.5 Hz), 7.41 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.14 (d, 2H, J = 8.0 Hz), 6.96 (d, 1H, J = 12.5 Hz), 6.24 (d, 1H, J = 12.5 Hz), 2.33 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.1, 147.9, 139.2, 138.9, 138.4, 136.2, 134.5, 132.1, 129.5, 129.0, 127.9, 127.4, 123.7, 121.6, 121.5, 116.6, 21.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{17}N_2O$: 289.1341; found 289.1331.

*(E)-N-(Quinolin-8-yl)-3-(p-tolyl)acrylamide (**5k**).* Compound **5k** was obtained (from the reaction of 8-aminoquinoline and 4-methylcinnamoyl chloride) after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 55% (160 mg); mp 157−159 °C; IR (KBr): 3343, 1628, 1528, 1485, 978 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.0 (br. s, 1H), 8.94 (dd, 1H, J_1 = 7.6 Hz, J_2 = 1.2 Hz), 8.84 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.5 Hz), 8.17 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.3 Hz), 7.82 (d, 1H, J = 15.5 Hz), 7.58 (t, 1H, J = 8.1 Hz), 7.53−7.51 (m, 1H), 7.52 (d, 2H, J = 7.8 Hz), 7.47 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.22 (d, 2H, J = 7.8 Hz), 6.77 (d, 1H, J = 15.5 Hz), 2.40 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 148.1, 142.1, 140.3, 138.4, 136.4, 134.7, 132.0, 129.6, 128.1, 127.9, 127.5, 121.7, 121.6, 120.4, 116.8, 21.5; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{17}N_2O$: 289.1341; found 289.1334.

*(Z)-3-(3-Fluorophenyl)-N-(quinolin-8-yl)acrylamide (**4l**).* Compound **4l** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a pale yellow-colored solid; Yield: 55% (40 mg), (*E*/*Z* = 12:88); mp 59−61 °C; IR (KBr): 3340, 1675, 1524, 1485, 877 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.92 (br. s, 1H), 8.84 (dd, 1H, J_1 = 7.2 Hz, J_2 = 1.7 Hz), 8.67 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.15 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.58−7.51 (m, 2H), 7.43 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.40−7.37 (m, 2H), 7.31−7.25 (m, 1H), 7.03−6.98 (m, 1H), 6.95 (d, 1H, J = 12.5 Hz), 6.34 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 162.6 (d, $J_{C\text{-}F}$ = 244.2 Hz) 148.1, 138.4, 137.7, 137.7, 137.1 (d, $J_{C\text{-}F}$ = 8.0 Hz), 136.3, 134.3, 129.8 (d, $J_{C\text{-}F}$ = 8.5 Hz), 127.9, 127.4, 125.7, 125.3 (d, $J_{C\text{-}F}$ = 2.9 Hz), 121.8, 121.6, 116.7, 116.2 (d, $J_{C\text{-}F}$ = 22.1 Hz), 115.6 (d, $J_{C\text{-}F}$ = 21.0 Hz); HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{14}FN_2O$: 293.1090; found 293.1091.

*(Z)-3-(2,3-Dihydrobenzo[b][1,4]dioxin-6-yl)-N-(quinolin-8-yl)-acrylamide (**4m**).* Compound **4m** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a colorless liquid; Yield: 85% (70 mg), (*E*:*Z* = 2:98); IR (DCM): 3411, 1748, 1420, 1364, 738 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.88 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.3 Hz), 8.71 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.15 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.56 (t, 1H, J = 8.2 Hz), 7.51 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.5 Hz), 7.43 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.29 (s, 1H), 7.20 (dd, 1H, J_1 = 8.6 Hz, J_2 = 2.1 Hz), 6.84 (d, 1H, J = 12.6 Hz), 6.82 (d, 1H, J = 8.4 Hz), 6.18 (d, 1H, J = 12.6 Hz), 4.26−4.19 (m, 4H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.0, 147.9, 144.4, 143.1, 138.9, 138.4, 136.3, 134.6, 128.4, 127.9, 127.4, 123.6, 123.0, 121.5, 121.5, 118.8, 117.1, 116.6, 64.5, 64.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{20}H_{17}N_2O_3$: 333.1239; found 333.1227.

*(Z)-3-(3,4-Dimethylphenyl)-N-(quinolin-8-yl)acrylamide (**4n**).* Compound **4n** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a green-colored liquid; Yield: 75% (57 mg), (*E*:*Z* = 3:97); IR (DCM): 3410, 1713, 1363, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.92 (br. s, 1H), 8.87 (dd, 1H, J_1 = 7.6 Hz, J_2 = 1.0 Hz), 8.61 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.14 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.56 (t, 1H, J = 8.2 Hz), 7.51 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.42−7.39 (m, 2H), 7.37 (br. s, 1H), 7.09 (d, 1H, J = 7.8 Hz), 6.95 (d, 1H, J = 12.5 Hz), 6.23 (d, 1H, J = 12.5 Hz), 2.23 (s, 3H), 2.17 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.3, 147.9, 139.2, 138.4, 137.5, 136.4, 136.2, 134.6, 132.5, 130.7, 129.6, 127.9, 127.4, 126.9, 123.7, 121.5, 121.5, 116.6, 19.7; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{20}H_{19}N_2O$: 303.1497; found 303.1488.

*(Z)-3-(2,4-Dimethoxyphenyl)-N-(quinolin-8-yl)acrylamide (**4o**).* Compound **4o** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a brown-colored liquid; Yield: 32% (27 mg), (*E*:*Z* = 30:70); IR (DCM): 3411, 1714, 1363, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.85 (dd, 1H, J_1 = 7.5 Hz, J_2 = 0.8 Hz), 8.62 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.13 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.66 (d, 1H, J = 8.5 Hz), 7.54 (t, 1H, J = 8.1 Hz), 7.48 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.40 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.14 (d, 1H, J = 12.4 Hz), 6.46 (d, 1H, J = 2.4 Hz), 6.41 (dd, 1H, J_1 = 8.5 Hz, J_2 = 2.4 Hz), 6.20 (d, 1H, J = 12.4 Hz), 3.84 (s, 3H), 3.78 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.4, 161.8, 158.7, 147.8, 138.4, 136.1, 134.8, 134.7, 131.8, 127.9, 127.4, 123.1, 121.4, 121.3, 116.8, 116.4, 104.4, 98.2, 55.6, 55.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{20}H_{19}N_2O_3$: 335.1396; found 335.1383.

*(Z)-3-(3,4-Dichlorophenyl)-N-(quinolin-8-yl)acrylamide (**4p**).* Compound **4p** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a pale yellow-colored solid; Yield: 63% (54 mg), (*E*/*Z* = 8:92); mp 101−103 °C; IR (KBr): 3337, 1675, 1525, 1485, 790 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.91 (br. s, 1H), 8.82 (dd, 1H, J_1 = 6.9 Hz, J_2 = 1.9 Hz), 8.68 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.15 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.74 (d, 1H, J = 1.7 Hz), 7.58−7.53 (m, 2H), 7.51 (dd, 1H, J_1 = 8.3 Hz, J_2 = 2.0 Hz), 7.45 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.37 (d, 1H, J = 8.4 Hz), 6.87 (d, 1H, J = 12.5 Hz), 6.35 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.9, 148.1, 138.3, 136.9, 136.3, 135.0, 134.2, 132.7, 132.4, 131.4, 130.2, 128.8, 127.9, 127.3, 126.1, 122.0, 121.7, 116.7; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{13}Cl_2N_2O$: 343.0405; found 343.0415.

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(Z)-3-(3,5-Dimethylphenyl)-N-(quinolin-8-yl)acrylamide (**4q**). Compound **4q** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a green-colored liquid; Yield: 73% (55 mg), (*E*:*Z* = 5:95); IR (DCM): 3411, 1713, 1421, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.89 (br. s, 1H), 8.86 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.7 Hz), 8.58 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.56 (t, 1H, J = 8.2 Hz), 7.50 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.40 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.21 (br. s, 2H), 6.96 (d, 1H, J = 12.5 Hz), 6.93 (br. s, 1H), 6.25 (d, 1H, J = 12.5 Hz), 2.22 (s, 6H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.2, 147.8, 139.0, 138.4, 137.8, 136.1, 134.8, 134.6, 130.4, 127.9, 127.4, 127.0, 124.7, 121.5, 121.5, 116.6, 21.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{20}H_{19}N_2O$: 303.1497; found 303.1488.

(Z)-N-(Quinolin-8-yl)-3-(thiophen-2-yl)acrylamide (**4r**). Compound **4r** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a green-colored liquid; Yield: 73% (51 mg), (*E*:*Z* = 20:80); IR (DCM): 3410, 1713, 1363, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.97 (br. s, 1H), 8.96 (dd, 1H, J_1 = 7.6 Hz, J_2 = 1.2 Hz), 8.81 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.17 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.58 (t, 1H, J = 8.1 Hz), 7.54–7.51 (m, 2H), 7.47–7.44 (m, 2H), 7.11 (d, 1H, J = 12.3 Hz), 7.08 (dd, 1H, J_1 = 5.1 Hz, J_2 = 3.7 Hz), 6.07 (d, 1H, J = 12.3 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 148.1, 138.4, 137.8, 136.4, 135.2, 134.6, 134.3, 131.8, 128.0, 127.5, 126.5, 121.6, 121.6, 117.5, 116.6; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{16}H_{13}N_2OS$: 281.0749; found 281.0737.

(E)-N-(Quinolin-8-yl)-3-(thiophen-2-yl)acrylamide (**5r**). Compound **5r** was obtained (from the reaction of 8-aminoquinoline and 2-thiophenecarbonyl chloride) after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a pale yellow-colored solid; Yield: 53% (150 mg); mp 158–160 °C; IR (KBr): 2922, 1617, 1526, 1484, 1159 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.94 (br. s, 1H), 8.91 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.4 Hz), 8.83 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.16 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.94 (d, 1H, J = 15.2 Hz), 7.56 (t, 1H, J = 8.2 Hz), 7.51 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.45 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.37 (d, 1H, J = 5.0 Hz), 7.29 (d, 1H, J = 3.6 Hz), 7.07 (dd, 1H, J_1 = 5.0 Hz, J_2 = 3.6 Hz), 6.60 (d, 1H, J = 15.2 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.9, 148.2, 140.0, 138.4, 136.4, 134.8, 134.6, 130.7, 128.1, 128.0, 127.9, 127.8, 127.5, 121.7, 120.3, 116.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{16}H_{13}N_2OS$: 281.0749; found 281.0742.

(Z)-3-(6-Fluoropyridin-3-yl)-N-(quinolin-8-yl)acrylamide (**4s**). Compound **4s** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 30:70) as a yellow-colored solid; Yield: 64% (47 mg), (*E*:*Z* = 40:60); mp 140–142 °C; IR (KBr): 3351, 1713, 1486, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.98 (br. s, 1H), 8.82 (dd, 1H, J_1 = 6.0 Hz, J_2 = 2.9 Hz), 8.75 (d, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.44–8.40 (td, 1H, J_1 = 8.0 Hz, J_2 = 2.4 Hz), 8.38 (d, 1H, J = 2.0 Hz), 8.18 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.58–7.53 (m, 2H), 7.47 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 6.93–6.90 (m, 1H), 6.91 (d, 1H, J = 12.5 Hz), 6.41 (d, 1H, J = 12.5 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.7, 163.3 (d, $J_{C\text{-}F}$ = 240.5 Hz), 149.2 (d, $J_{C\text{-}F}$ = 14.9 Hz), 148.2, 142.4 (d, $J_{C\text{-}F}$ = 8.1 Hz), 138.3, 136.4, 135.2, 134.1, 128.9 (d, $J_{C\text{-}F}$ = 4.8 Hz), 127.9, 127.3, 125.9, 122.1, 121.8, 116.8, 109.0 (d, $J_{C\text{-}F}$ = 37.1 Hz); HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{17}H_{13}FN_3O$: 294.1043; found 294.1032.

(Z)-3-(5-Bromopyridin-2-yl)-N-(quinolin-8-yl)acrylamide (**4t**). Compound **4t** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 30:70) as a yellow-colored solid; Yield: 59% (52 mg), (*E*:*Z* = 40:60); mp 123–125 °C; IR (KBr): 3411, 1715, 1420, 1364, 739 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 12.7 (br. s, 1H), 8.97 (dd, 1H, J_1 = 6.7 Hz, J_2 = 2.3 Hz), 8.89 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.88 (d, 1H, J = 2.3 Hz), 8.20 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.7 Hz), 7.87 (dd, 1H, J_1 = 8.4 Hz, J_2 = 2.4 Hz), 7.61–7.55 (m, 2H), 7.55–7.49 (m, 2H), 6.84 (d, 1H, J = 13.4 Hz), 6.44 (d, 1H, J = 13.4 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 152.1, 150.3, 148.3, 139.5, 139.3, 136.4, 135.4, 134.2, 130.5, 128.2, 127.4, 126.7, 122.2, 121.5, 120.3, 118.1; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{17}H_{13}BrN_3O$: 354.0242; found 354.0233.

3,3-Diphenyl-N-(quinolin-8-yl)acrylamide (**6b**). Compound **6b** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 65% (57 mg); mp 123–125 °C; IR (KBr): 3440, 1652, 1522, 1325, 825 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.84 (br. s, 1H), 8.86 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 8.59 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.07 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.50 (t, 1H, J_1 = 8.2 Hz), 7.46–7.40 (m, 11H), 7.36 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.3 Hz), 6.70 (s, 1H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.6, 152.2, 147.7, 141.4, 138.4, 138.4, 136.1, 134.6, 129.8, 129.2, 128.6, 128.5, 128.5, 128.4, 127.8, 127.4, 122.8, 121.5, 121.4, 116.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{24}H_{19}N_2O$: 351.1497; found 351.1501.

(Z)-3-(4-Chlorophenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6c**). Compound **6c** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 53% (51 mg); mp 137–139 °C; IR (KBr): 3058, 1714, 1420, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.82 (br. s, 1H), 8.79 (dd, 1H, J_1 = 6.8 Hz, J_2 = 2.2 Hz), 8.64 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.54–7.47 (m, 2H), 7.43 (t, 1H, J = 4.2 Hz), 7.41–7.33 (m, 9H), 6.66 (s, 1H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.2, 151.2, 147.9, 141.0, 138.3, 136.8, 136.2, 134.6, 134.4, 131.2, 129.4, 128.8, 128.5, 128.3, 127.8, 127.4, 122.9, 121.6, 116.5; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{24}H_{18}ClN_2O$: 385.1108; found 385.1100.

(Z)-3-(4-Methoxyphenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6d**). Compound **6d** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a brown-colored liquid; Yield: 64% (61 mg); IR (DCM): 3414, 1713, 1647, 1269, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.84 (br. s, 1H), 8.83 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 8.57 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.10 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.52 (t, 1H, J = 7.6 Hz), 7.46 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.5 Hz), 7.41–7.37 (m, 6H), 7.34 (d, 2H, J = 8.8 Hz), 6.92 (d, 2H, J = 8.8 Hz), 6.58 (s, 1H), 3.78 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.9, 160.1, 152.0, 147.6, 141.9, 138.4, 136.1, 134.7, 131.4, 130.4, 129.1, 128.5, 128.4, 127.8, 127.4, 122.3, 121.4, 121.2, 116.4, 113.9, 55.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{25}H_{21}N_2O_2$: 381.1603; found 381.1569.

(Z)-3-Phenyl-N-(quinolin-8-yl)-3-(p-tolyl)acrylamide (**6e**). Compound **6e** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 25:75) as a yellow-colored solid; Yield: 60% (55 mg); mp 146–148 °C; IR (KBr): 3004, 1713, 1422, 1363, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.82 (br. s, 1H), 8.82 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.4 Hz), 8.57 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.11 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.51 (t, 1H, J = 8.2 Hz), 7.47 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.41–7.39 (m, 6H), 7.29 (d, 2H, J = 7.9 Hz), 7.20 (d, 2H, J = 7.9 Hz), 6.62 (s, 1H), 2.35 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.8, 152.4, 147.6, 141.7, 138.4, 138.4, 136.1, 135.4, 134.7, 129.8, 129.2, 129.1, 128.4, 128.4, 127.8, 127.4, 122.4, 121.4, 121.3, 116.5, 21.4 ; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{25}H_{21}N_2O$: 365.1654; found 365.1658.

(Z)-3-(4-Ethylphenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6f**). Compound **6f** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a brown-colored liquid; Yield: 47% (44 mg); IR (DCM): 3410, 1713, 1522, 1363, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.78 (br. s, 1H), 8.81 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.4 Hz), 8.55 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.10 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.7 Hz), 7.51 (t, 1H, J = 8.2 Hz), 7.46 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.5 Hz), 7.40–7.36 (m, 6H), 7.31 (d, 2H, J = 8.3 Hz), 7.20 (d, 2H, J = 8.3 Hz), 6.60 (s, 1H), 2.63 (q, 2H, J = 7.6 Hz), 1.16 (t, 3H, J = 7.6 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.9, 152.3, 147.6, 144.7, 141.7, 138.4, 136.1, 135.5, 134.6, 129.9, 129.0, 128.5, 128.4, 127.9, 127.7, 127.4, 122.6, 121.3, 121.2, 116.3, 28.6, 15.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{26}H_{23}N_2O$: 379.1810; found 379.1803.

(Z)-3-(4-Nitrophenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6g**). Compound **6g** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored liquid; Yield: 50% (49 mg); IR (DCM): 3441, 1713, 1522, 1222,

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737 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.90 (br. s, 1H), 8.72 (dd, 1H, J_1 = 6.2 Hz, J_2 = 2.8 Hz), 8.70 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.28 (d, 2H, J = 8.8 Hz), 8.16 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.55 (d, 2H, J = 8.8 Hz), 7.51−7.50 (m, 2H), 7.46−7.39 (m, 4H), 7.35−7.28 (m, 2H), 6.79 (s, 1H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 163.3, 151.1, 148.0, 147.7, 146.0, 139.9. 138.3, 136.4, 134.2, 130.5, 129.8, 128.8, 128.1, 127.9, 127.4, 123.6, 123.1, 121.9, 121.7, 116.8; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{24}H_{18}N_3O_3$: 396.1348; found 396.1335.

*(Z)-3-(4-Fluorophenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6h**).* Compound **6h** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored liquid; Yield: 40% (37 mg); IR (DCM): 3331, 1713, 1523, 1325, 737 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.80 (br. s, 1H), 8.80 (dd, 1H, J_1 = 7.0 Hz, J_2 = 2.0 Hz), 8.63 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.52−7.47 (m, 2H), 7.44−7.35 (m, 8H), 7.09 (t, 2H, J = 8.8 Hz), 6.65 (s, 1H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 164.4, 163.1 (d, $J_{C\text{-}F}$ = 246.2 Hz), 151.3, 147.8, 141.2, 138.3, 136.2, 134.4, 134.3 (d, $J_{C\text{-}F}$ = 3.1 Hz), 131.7 (d, $J_{C\text{-}F}$ = 8.2 Hz), 129.3, 128.5, 128.3, 127.8, 127.4, 122.9, 121.5, 121.5, 116.5, 115.6 (d, $J_{C\text{-}F}$ = 21.3 Hz); HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{24}H_{18}FN_2O$: 369.1403; found 369.1407.

*(Z)-3-(3-Nitrophenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6i**).* Compound **6i** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a yellow-colored solid; Yield: 60% (59 mg); mp 161−162 °C; IR (KBr): 3437, 1673, 1524, 1484, 826 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.88 (br. s, 1H), 8.71 (dd, 1H, J_1 = 6.8 Hz, J_2 = 3.4 Hz), 8.68 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.25−8.23 (m, 2H), 8.15 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.74 (dt, 1H, J_1 = 7.7 Hz, J_2 = 1.6 Hz), 7.59−7.54 (m, 1H), 7.50 (s, 1H), 7.49 (d, 1H, J = 2.3 Hz), 7.47−7.39 (m, 4H), 7.35 (dd, 2H, J_1 = 7.9 Hz, J_2 = 1.5 Hz), 6.78 (s, 1H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 163.3, 150.7, 148.2, 148.0, 140.5, 140.1, 138.3, 136.4, 135.8, 134.2, 129.8, 129.2, 128.8, 128.2, 127.9, 127.4, 124.5, 123.2, 121.8, 121.7, 116.7; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{24}H_{18}N_3O_3$: 396.1348; found 396.1350.

*(Z)-3-(2,3-Dihydrobenzo[b][1,4]dioxin-6-yl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6j**).* Compound **6j** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a pale yellow-colored solid; Yield: 70% (71 mg); mp 117−119 °C; IR (KBr): 3411, 1714, 1420, 1270, 703 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.86 (br. s, 1H), 8.83 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.2 Hz), 8.64 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.10 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.52 (t, 1H, J = 7.8 Hz), 7.46 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.41−7.36 (m, 6H), 6.93−6.90 (m, 3H), 6.57 (s, 1H), 4.21−4.15 (m, 4H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 164.8, 151.5, 147.7, 144.2, 143.6, 141.5, 138.4, 136.1, 134.7, 131.4, 129.1, 128.4, 128.4, 127.8, 127.4, 123.3, 122.6, 121.4, 121.3, 118.9, 117.4, 116.4, 64.4, 64.2; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{26}H_{21}N_2O_3$: 409.1552; found 409.1533.

*(Z)-3-(3,5-Dimethylphenyl)-3-phenyl-N-(quinolin-8-yl)acrylamide (**6k**).* Compound **6k** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a green-colored solid; Yield: 59% (56 mg); mp 198−200 °C; IR (KBr): 3410, 1713, 1363, 1222, 738 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.76 (br. s, 1H), 8.81 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.0 Hz), 8.55 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.10 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.51 (t, 1H, J = 8.1 Hz), 7.46 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.41−7.37 (m, 6H), 7.01 (br. s, 2H), 6.99 (br. s, 1H), 6.62 (s, 1H), 2.26 (s, 6H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 164.9, 152.1, 147.6, 141.4, 138.5, 138.1, 138.1, 136.0, 134.7, 130.2, 129.0, 128.4, 128.3, 127.8, 127.4, 127.3, 122.8, 121.4, 121.3, 116.4, 21.4; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{26}H_{23}N_2O$: 379.1810; found 379.1803.

*(Z)-3-Phenyl-N-(quinolin-8-yl)-3-(thiophen-2-yl)acrylamide (**6l**).* Compound **6l** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a green-colored liquid; Yield: 81% (72 mg); IR (DCM): 3343, 1522, 1483, 1160, 825 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 10.00 (br. s, 1H), 8.86 (dd, 1H, J_1 = 7.3 Hz, J_2 = 1.1 Hz), 8.67 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.54 (t, 1H, J = 7.6 Hz), 7.51−7.38 (m, 8H), 7.27 (dd, 1H, J_1 = 3.6 Hz, J_2 = 1.2 Hz), 7.03 (dd, 1H, J_1 = 5.1 Hz, J_2 = 3.6 Hz), 6.53 (s, 1H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 164.4, 147.9, 144.5, 141.8, 139.1, 138.4, 136.2, 134.6, 130.6, 129.3, 128.5, 128.4, 128.3, 127.9, 127.4, 127.1, 123.6, 121.5, 121.5, 116.6; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{22}H_{17}N_2OS$: 357.1062; found 357.1053.

*3,3-Bis(4-methoxyphenyl)-N-(quinolin-8-yl)acrylamide (**6m**).* Compound **6m** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 61% (63 mg); mp 153−155 °C; IR (KBr): 3316, 1603, 1522, 1484, 1385, 791 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.79 (br. s, 1H), 8.82 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 8.56 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 8.10 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.50 (t, 1H, J = 8.1 Hz), 7.45 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.38 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.32 (d, 2H, J = 8.8 Hz), 7.30 (d, 2H, J = 8.8 Hz), 6.92 (d, 2H, J = 8.8 Hz), 6.90 (d, 2H, J = 8.8 Hz), 6.52 (s, 1H), 3.86 (s, 3H), 3.78 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 165.1, 160.5, 160.1, 151.7, 147.6, 138.4, 136.1, 134.8, 134.2, 131.4, 130.6, 129.9, 127.8, 127.4, 121.4, 121.1, 120.5, 116.3, 113.9, 113.7, 55.4, 55.2; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{26}H_{23}N_2O_3$: 411.1709; found 411.1728.

*3,3-Bis(4-chlorophenyl)-N-(quinolin-8-yl)acrylamide (**6n**).* Compound **6n** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 51% (54 mg); mp 156−158 °C; IR (KBr): 3331, 1657, 1524, 1486, 1091, 826 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.81 (br. s, 1H), 8.77 (dd, 1H, J_1 = 6.2 Hz, J_2 = 2.8 Hz), 8.64 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.14 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.7 Hz), 7.54−7.49 (m, 2H), 7.43 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.40−7.35 (m, 4H), 7.32−7.27 (m, 4H), 6.63 (s, 1H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 163.9, 149.9, 147.9, 139.4, 138.3, 136.4, 136.2, 135.5, 134.9, 134.3, 131.1, 129.6, 128.9, 128.8, 127.8, 127.4, 123.2, 121.7, 121.6, 116.6; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{24}H_{17}Cl_2N_2O$: 419.0718; found 419.0720.

*N-(Quinolin-8-yl)-3,3-di-p-tolylacrylamide (**6o**).* Compound **6o** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless solid; Yield: 55% (52 mg); mp 175−177 °C; IR (KBr): 2923, 1656, 1521, 1484, 1326, 824 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.78 (br. s, 1H), 8.81 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.1 Hz), 8.57 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.11 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.50 (t, 1H, J = 8.2 Hz), 7.46 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.5 Hz), 7.39 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.28 (d, 2H, J = 8.0 Hz), 7.27 (d, 2H, J = 8.0 Hz), 7.19 (d, 2H, J = 8.0 Hz), 7.18 (d, 2H, J = 8.0 Hz), 6.59 (s, 1H), 2.40 (s, 3H), 2.35 (s, 3H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 164.9, 152.4, 147.5, 139.2, 138.8, 138.4, 138.3, 136.1, 135.5, 134.7, 129.8, 129.1, 129.1, 128.3, 127.8, 127.4, 121.6, 121.3, 121.2, 116.4, 21.4, 21.3; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{26}H_{23}N_2O$: 379.1810; found 379.1801.

*N-(Quinolin-8-yl)-3,3-di(thiophen-2-yl)acrylamide (**6p**).* Compound **6p** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a pale yellow-colored liquid; Yield: 55% (50 mg); IR (DCM): 3339, 1523, 1423, 1326, 1133, 1048 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 9.93 (br. s, 1H), 8.81 (dd, 1H, J_1 = 7.2 Hz, J_2 = 1.6 Hz), 8.67 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.13 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.54−7.49 (m, 2H), 7.46 (dd, 1H, J_1 = 5.2 Hz, J_2 = 4.4 Hz), 7.43−7.40 (m, 2H), 7.33 (dd, 1H, J_1 = 3.6 Hz, J_2 = 1.2 Hz), 7.13 (dd, 1H, J_1 = 3.7 Hz, J_2 = 1.2 Hz), 7.10 (dd, 1H, J_1 = 5.1 Hz, J_2 = 3.6 Hz), 7.06 (dd, 1H, J_1 = 5.1 Hz, J_2 = 3.7 Hz), 6.71 (s, 1H); ^{13}C{^{1}H} NMR (100 MHz, $CDCl_3$): δ 163.7, 147.8, 145.1, 138.4, 137.7, 137.4, 136.2, 134.6, 129.7, 129.2, 127.9, 127.8, 127.8, 127.4, 127.1, 122.0, 121.5, 121.5, 116.6; HRMS (ESI): m/z [M + H]$^+$ calcd for $C_{20}H_{15}N_2OS_2$: 363.0626; found 363.0620.

*3,3-Bis(4-methoxyphenyl)-N-(naphthalen-1-yl)acrylamide (**7a**).* Compound **7a** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a colorless liquid; Yield: 49% (50 mg); IR (DCM): 3441, 1748, 1420, 1363, 737 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$): δ 8.18 (d, 1H, J = 7.4 Hz), 7.80 (d, 1H, J = 8.2 Hz), 7.70 (br. s, 1H), 7.61 (d, 1H, J = 8.1 Hz), 7.47−7.39 (m, 4H), 7.30−7.24 (m, 3H), 7.02 (d, 2H, J = 8.4 Hz), 6.90 (d, 2H, J = 8.6 Hz),

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6.65 (d, 1H, J = 8.4 Hz), 6.54 (s, 1H), 3.86 (s, 3H), 3.83 (s, 3H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.4, 160.6, 149.6, 133.9, 133.6, 132.4, 131.4, 130.4, 129.7, 128.6, 125.9, 125.7, 125.5, 124.7, 121.3, 120.0, 118.8, 114.7, 113.8, 55.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{27}H_{24}NO_3$: 410.1756; found 410.1749.

*3,3-Bis(4-methoxyphenyl)-N-(1-phenylethyl)acrylamide (**8a**).* Compound **8a** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 30:70) as a colorless solid; Yield: 52% (50 mg); mp 130−132 °C; IR (KBr): 3415, 1713, 1511, 1248, 1032 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 7.28−7.23 (m, 3H), 7.21 (d, 2H, J = 8.8 Hz), 7.18 (d, 2H, J = 8.7 Hz), 7.03 (dd, 2H, J_1 = 7.9 Hz, J_2 = 1.6 Hz), 6.89 (d, 2H, J = 8.7 Hz), 6.84 (d, 2H, J = 8.8 Hz), 6.31 (s, 1H), 5.53 (d, 1H, J = 7.9 Hz), 5.04 (q, 1H, J = 6.8 Hz), 3.85 (s, 3H), 3.82 (s, 3H), 1.26 (d, 3H, J = 6.8 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 166.1, 160.3, 159.9, 148.8, 143.0, 133.4, 130.8, 130.6, 129.4, 128.5, 127.2, 126.1, 120.8, 114.1, 113.7, 55.3, 55.3, 48.6, 21.6; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{25}H_{26}NO_3$: 388.1913; found 388.1913.

*(E)-3-(4-Ethylphenyl)-N-(1-phenylethyl)acrylamide (**9**).* Compound **9** was obtained after purification by column chromatography on silica gel (EtOAc:Hexanes = 25:75) as a colorless solid; Yield: 72% (50 mg); mp 117−119 °C; IR (KBr): 3292, 1619, 1542, 1224, 827 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 7.64 (d, 1H, J = 15.6 Hz), 7.41 (d, 2H, J = 8.1 Hz), 7.39−7.33 (m, 3H), 7.30−7.26 (m, 2H), 7.18 (d, 2H, J = 8.1 Hz), 6.45 (d, 1H, J = 15.6 Hz), 6.34 (d, 1H, J = 7.8 Hz), 5.32−5.28 (m, 1H), 2.66 (q, 2H, J = 7.6 Hz), 1.57 (d, 3H, J = 6.9 Hz), 1.26 (t, 3H, J = 7.6 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.3, 146.2, 143.3, 141.2, 132.3, 128.7, 128.3, 127.9, 127.4, 126.3, 119.8, 48.9, 28.8, 21.8, 15.4; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{22}NO$: 280.1701; found 280.1696.

*4′-Methoxy-N-(quinolin-8-yl)-3,4,5,6-tetrahydro-[1,1′-biphenyl]-2-carboxamide (**10a**).* Compound **10a** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless liquid; Yield: 40% (36 mg); IR (DCM): 3344, 1520, 1483, 1248, 1033 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.40 (br. s, 1H), 8.72 (dd, 1H, J_1 = 7.5 Hz, J_2 = 0.9 Hz), 8.55 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.5 Hz), 8.05 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.48 (t, 1H, J = 8.1 Hz), 7.41 (dd, 1H, J_1 = 8.2 Hz, J_2 = 0.9 Hz), 7.34 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.29 (d, 2H, J = 8.6 Hz), 6.70 (d, 2H, J = 8.6 Hz), 3.57 (s, 3H), 2.64−2.63 (m, 2H), 2.50−2.48 (m, 2H), 1.84−1.80 (m, 4H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 169.9, 159.0, 147.5, 140.2, 138.4, 135.9, 134.7, 132.6, 128.8, 127.7, 127.3, 121.2, 121.0, 116.0, 113.7, 55.1, 32.0, 27.2, 22.8, 22.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{23}H_{23}N_2O_2$: 359.1760; found 359.1762.

*2-(2,3-Dihydrobenzo[b][1,4]dioxin-6-yl)-N-(quinolin-8-yl)-cyclohex-1-enecarboxamide (**10b**).* Compound **10b** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 25:75) as a colorless solid; Yield: 53% (51 mg); mp 131−133 °C; IR (KBr): 3334, 1661, 1523, 1423, 1068 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.44 (br. s, 1H), 8.72 (d, 1H, J = 7.5 Hz), 8.62 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.07 (d, 1H, J = 8.2 Hz), 7.49 (t, 1H, J = 8.0 Hz), 7.41 (d, 1H, J = 8.1 Hz), 7.36 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.1 Hz), 6.91 (d, 1H, J = 1.8 Hz), 6.81 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.8 Hz), 6.61 (d, 1H, J = 8.3 Hz), 4.06−4.00 (m, 4H), 2.62−2.60 (m, 2H), 2.48−2.46 (m, 2H), 1.85−1.79 (m, 4H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 169.7, 147.5, 143.4, 142.9, 140.2, 138.5, 136.0, 135.3, 134.8, 132.8, 127.7, 127.4, 121.2, 121.0, 121.0, 117.0, 116.5, 116.0, 64.2, 64.1, 32.0, 27.1, 22.8, 22.2; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{24}H_{23}N_2O_3$: 387.1709; found 387.1705.

*2-(2,3-Dihydrobenzo[b][1,4]dioxin-6-yl)-N-(quinolin-8-yl)cyclopent-1-enecarboxamide (**10c**).* Compound **10c** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 25:75) as a colorless semisolid; Yield: 20% (19 mg) ; IR (KBr): 3354, 1667, 1527, 1485, 1068 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.88 (br. s, 1H), 8.83 (dd, 1H, J_1 = 7.7 Hz, J_2 = 1.1 Hz), 8.54 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.7 Hz), 8.10 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.7 Hz), 7.53 (t, 1H, J = 8.1 Hz), 7.46 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.3 Hz), 7.37 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 6.97−6.94 (m, 2H), 6.83 (d, 1H, J = 8.8 Hz), 4.22−4.19 (m, 2H), 4.18−4.14 (m, 2H), 3.06−3.01 (m, 2H), 2.95−2.90 (m, 2H), 2.11−2.04 (m, 2H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.4, 147.5, 147.3, 143.7, 143.5, 138.5, 136.0, 134.8, 133.5, 129.9, 127.8, 127.4, 121.3, 121.2, 121.0, 117.4, 117.0, 116.2, 64.4, 64.2, 40.3, 35.6, 21.9; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{23}H_{21}N_2O_3$: 373.1552; found 373.1548.

*(Z)-3-(4-Methoxyphenyl)-N-(quinolin-8-yl)hex-2-enamide (**10d**).* Compound **10d** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a brown-colored solid; Yield: 51% (44 mg); mp 93−95 °C; IR (KBr): 3343, 1606, 1523, 1484, 1380, 792 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.64 (br. s, 1H), 8.77 (dd, 1H, J_1 = 7.5 Hz, J_2 = 1.3 Hz), 8.53 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.08 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.48 (t, 1H, J = 8.1 Hz), 7.43 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.4 Hz), 7.37 (dd, 1H, J_1 = 8.3 Hz, J_2 = 4.2 Hz), 7.30 (d, 2H, J = 8.7 Hz), 6.89 (d, 2H, J = 8.7 Hz), 6.14 (s, 1H), 3.75 (s, 3H), 2.52 (dt, 2H, J_1 = 7.6 Hz, J_2 = 1.0 Hz), 1.51−1.45 (m, 2H), 0.97 (t, 3H, J = 7.3 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.2, 159.6, 153.7, 147.5, 138.4, 136.0, 134.7, 131.3, 129.2, 127.7, 127.4, 122.3, 121.3, 121.0, 116.2, 114.0, 55.2, 42.4, 20.8, 13.7; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{22}H_{23}N_2O_2$: 347.1760; found 347.1773.

*(Z)-3-(3-Nitrophenyl)-N-(quinolin-8-yl)hex-2-enamide (**10e**).* Compound **10e** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 25:75) as a pale yellow-colored solid; Yield: 52% (47 mg); mp 176−178 °C; IR (KBr): 3342, 1677, 1524, 1484, 1348, 740 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.66 (br. s, 1H), 8.67−8.63 (m, 2H), 8.23 (br. s, 1H), 8.18−8.11 (m, 2H), 7.63 (d, 1H, J = 7.6 Hz), 7.52−7.46 (m, 3H), 7.42 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 6.30 (s, 1H), 2.56 (t, 2H, J = 7.5 Hz), 1.56−1.47 (m, 2H), 1.01 (t, 3H, J = 7.3 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 163.6, 152.7, 148.2, 147.9, 141.6, 138.2, 136.3, 134.2, 134.2, 129.2, 127.8, 127.3, 123.2, 122.7, 122.4, 121.6, 116.5, 42.1, 20.6, 13.6; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{21}H_{20}N_3O_3$: 362.1505; found 362.1514.

*(Z)-N-(Quinolin-8-yl)-3-(thiophen-2-yl)hex-2-enamide (**10f**).* Compound **10f** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless liquid; Yield: 57% (46 mg); IR (DCM): 2923, 1663, 1523, 1483, 791 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.86 (br. s, 1H), 8.81 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.2 Hz), 8.65 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.12 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.53 (t, 1H, J = 8.2 Hz), 7.48 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.5 Hz), 7.40 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.33 (dd, 1H, J_1 = 5.1 Hz, J_2 = 1.1 Hz), 7.26 (dd, 1H, J_1 = 3.6 Hz, J_2 = 1.1 Hz), 6.96 (dd, 1H, J_1 = 5.1 Hz, J_2 = 3.6 Hz), 6.18 (s, 1H), 2.57 (dt, 2H, J_1 = 7.5 Hz, J_2 = 1.0 Hz), 1.64−1.54 (m, 2H), 1.0 (t, 3H, J = 7.3 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.0, 147.8, 144.9, 139.8, 138.4, 136.1, 134.6, 127.9, 127.8, 127.4, 127.2, 126.7, 122.9, 121.4, 121.3, 116.4, 42.9, 21.4, 13.7; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{19}H_{19}N_2OS$: 323.1218; found 323.1206.

*(Z)-3-(5-Bromopyridin-2-yl)-N-(quinolin-8-yl)hex-2-enamide (**10g**).* Compound **10g** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a brown-colored liquid; Yield: 50% (50 mg); IR (DCM): 2922, 1672, 1525, 1485, 1160 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.81 (br. s, 1H), 8.76−8.75 (m, 1H), 8.73−8.72 (m, 1H), 8.69 (t, 1H, J = 4.5 Hz), 8.13 (d, 1H, J = 8.2 Hz), 7.70 (dd, 1H, J_1 = 8.2 Hz, J_2 = 0.5 Hz), 7.48−7.47 (m, 2H), 7.44 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.27 (d, 1H, J = 8.5 Hz), 6.31 (br. s, 1H), 2.63 (t, 2H, J = 7.5 Hz), 1.53−1.46 (m, 2H), 0.99 (t, 3H, J = 7.3 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.1, 156.6, 152.7, 150.4, 148.0, 138.6, 138.3, 136.3, 134.4, 127.9, 127.3, 125.1, 123.3, 121.6, 121.6, 119.7, 116.7, 40.3, 20.7, 13.7; HRMS (ESI): m/z $[M + Na]^+$ calcd for $C_{20}H_{18}BrN_3NaO$: 418.0531; found 418.0539.

*(Z)-N-(Quinolin-8-yl)-3-(thiophen-2-yl)pent-2-enamide (**10h**).* Compound **10h** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a brown-colored liquid; Yield: 80% (62 mg); IR (DCM): 3347, 1664, 1522, 1483, 1262, 791 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.86 (br. s, 1H), 8.81 (dd, 1H, J_1 = 7.4 Hz, J_2 = 1.2 Hz), 8.64 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.11 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 7.53 (t, 1H, J = 8.2 Hz), 7.47 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.5 Hz), 7.40 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.32 (dd, 1H, J_1 = 5.1 Hz, J_2 = 1.1 Hz), 7.27 (dd, 1H, J_1 = 3.6 Hz, J_2 = 1.1 Hz), 6.96 (dd, 1H, J_1 = 5.1 Hz, J_2 = 3.6 Hz),

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6.18 (t, 1H, J = 1.2 Hz), 2.62 (dq, 2H, J_1 = 7.4 Hz, J_2 = 1.2 Hz), 1.21 (t, 3H, J = 7.4 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 165.3, 147.8, 146.2, 139.9, 138.4, 136.1, 134.6, 127.8, 127.8, 127.4, 127.2, 126.6, 121.8, 121.5, 121.4, 116.4, 33.7, 12.9; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{18}H_{17}N_2OS$: 309.1062; found 309.1058.

*(Z)-3-(5-Bromopyridin-2-yl)-N-(quinolin-8-yl)pent-2-enamide (**10i**).* Compound **10i** was obtained after purification by column chromatography on neutral alumina (EtOAc:Hexanes = 20:80) as a colorless liquid; Yield: 63% (60 mg); IR (DCM): 3339, 1677, 1524, 1325, 791 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 9.82 (br. s, 1H), 8.75−8.73 (m, 2H), 8.69 (t, 1H, J = 4.6 Hz), 8.13 (dd, 1H, J_1 = 8.2 Hz, J_2 = 1.6 Hz), 7.71 (dd, 1H, J_1 = 8.3 Hz, J_2 = 2.4 Hz), 7.49 (s, 1H), 7.48 (dd, 1H, J_1 = 4.9 Hz, J_2 = 0.8 Hz), 7.44 (dd, 1H, J_1 = 8.2 Hz, J_2 = 4.2 Hz), 7.26 (dd, 1H, J_1 = 8.3 Hz, J_2 = 0.4 Hz), 6.30 (t, 1H, J = 1.4 Hz), 2.67 (dq, 2H, J_1 = 7.4 Hz, J_2 = 1.4 Hz), 1.16 (t, 3H, J = 7.4 Hz); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.2, 156.8, 154.0, 150.4, 148.0, 138.6, 138.2, 136.3, 134.4, 127.9, 127.3, 124.9, 122.3, 121.6, 121.6, 119.7, 116.7, 31.2, 12.1; HRMS (ESI): m/z $[M + Na]^+$ calcd for $C_{19}H_{17}BrN_3O$: 382.0555; found 382.0560.

*(E)-3-Phenyl-N-(quinolin-8-yl)-4-(4-(trifluoromethyl)phenyl)but-2-enamide (**11a**).* Compound **11a** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a colorless liquid; Yield: 79% (85 mg); IR (DCM): 3057, 1713, 1524, 1424, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.09 (br. s, 1H), 8.92 (dd, 1H, J_1 = 7.2 Hz, J_2 = 1.7 Hz), 8.22 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.19 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.60−7.53 (m, 2H), 7.51−7.43 (m, 7H), 7.40−7.36 (m, 3H), 6.61 (s, 1H), 4.77 (s, 2H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 154.0, 148.2, 143.3, 140.9, 138.4, 136.5, 134.6, 129.2, 129.0, 128.4 (q, $J_{C\text{-}F}$ = 32.0 Hz), 128.0, 127.5, 126.9, 125.3 (q, $J_{C\text{-}F}$ = 3.6 Hz), 124.4 (q, $J_{C\text{-}F}$ = 270.3 Hz), 122.5, 121.8, 121.7, 116.6, 36.0; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{26}H_{20}F_3N_2O$: 433.1528; found 433.1546.

*(E)-4-(4-Nitrophenyl)-3-phenyl-N-(quinolin-8-yl)but-2-enamide (**11b**).* Compound **11b** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a pale yellow-colored liquid; Yield: 54% (55 mg); IR (KBr): 3345, 1670, 1522, 1343, 1161 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.09 (br. s, 1H), 8.88 (dd, 1H, J_1 = 6.6 Hz, J_2 = 2.4 Hz), 8.83 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.20 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.7 Hz), 8.08 (d, 2H, J = 8.8 Hz), 7.58−7.57 (m, 2H), 7.51−7.46 (m, 5H), 7.39−7.37 (m, 3H), 6.62 (s, 1H), 4.81 (s, 2H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.2, 153.5, 148.2, 147.1, 146.4, 140.6, 138.4, 136.5, 134.5, 129.6, 129.2, 128.8, 128.0, 127.4, 126.9, 123.6, 122.8, 121.9, 121.8, 116.7, 36.1; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{25}H_{20}N_3O_3$: 410.1505; found 410.1487.

*(E)-4-(3-Chlorophenyl)-3-phenyl-N-(quinolin-8-yl)but-2-enamide (**11c**).* Compound **11c** was obtained after purification by column chromatography on silica (EtOAc:Hexanes = 25:75) as a pale yellow-colored liquid; Yield: 56% (56 mg); IR (DCM): 3412, 1713, 1363, 1222, 737 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$): δ 10.06 (br. s, 1H), 8.92 (dd, 1H, J_1 = 7.3 Hz, J_2 = 1.4 Hz), 8.82 (dd, 1H, J_1 = 4.2 Hz, J_2 = 1.6 Hz), 8.19 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.6 Hz), 7.60−7.53 (m, 2H), 7.50−7.47 (m, 3H), 7.41−7.36 (m, 3H), 7.33−7.31 (m, 1H), 7.20−7.11 (m, 3H), 6.59 (s, 1H), 4.69 (s, 2H); $^{13}C\{^1H\}$ NMR (100 MHz, $CDCl_3$): δ 164.4, 154.1, 148.2, 141.1, 141.0, 138.4, 136.4, 134.7, 129.6, 128.9, 128.8, 128.6, 128.0, 127.5, 127.0, 126.9, 126.2, 122.5, 121.7, 116.6, 35.8; HRMS (ESI): m/z $[M + H]^+$ calcd for $C_{25}H_{20}ClN_2O$: 399.1264; found 399.1275.

■ ASSOCIATED CONTENT

Supporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI: 10.1021/acs.joc.5b02264.

X-ray structures, copies of ^1H and ^{13}C NMR charts of pure and relevant crude samples, arylation reactions and experiments related to E/Z isomerization, and some unsuccessful arylation and amide hydrolysis reactions (PDF)

Crystallographic data (CIF)

Crystallographic data (CIF)

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Notes

The authors declare no competing financial interest.

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