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Cu(II)-mediated Cross-Dehydrogenative Coupling of Indolines with Sulfonamides, Carboxamides and Amines

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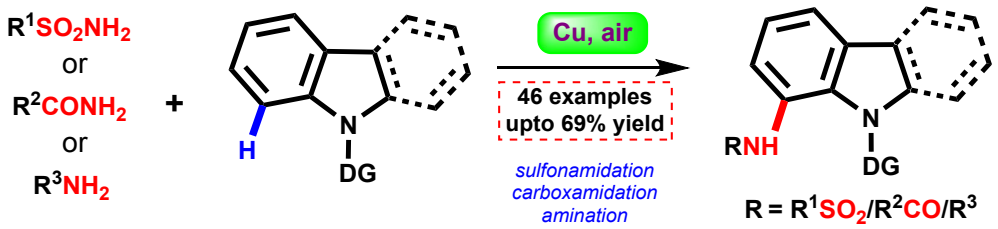
GRAPHICAL ABSTRACT



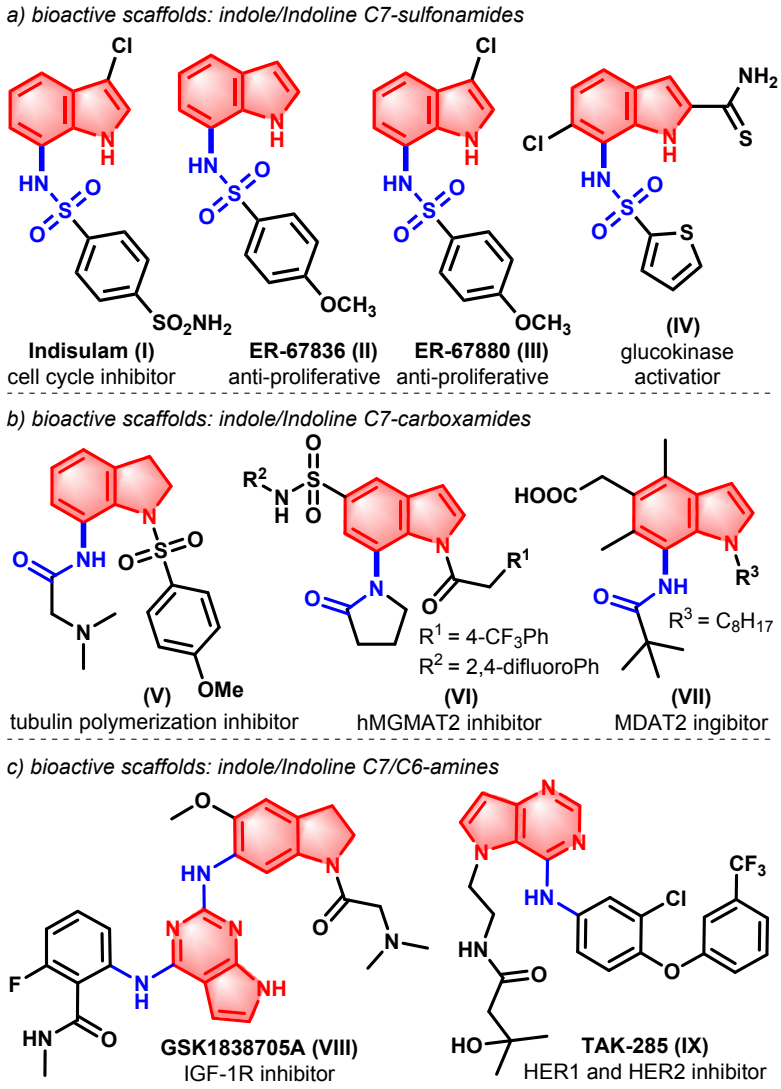
ABSTRACT. A facile and efficient Cu-mediated protocol for the cross-dehydrogenative coupling of indoline with sulfonamides, carboxamides, and anilines is reported. The reaction takes place through Cu-mediated C7−H activation via six membered metallacycle to afford the amide and amine derivatives in good yields with a wide range of functional group tolerance. The importance of the protocol has been demonstrated by synthesizing the antiproliferative agent ER-67836.

INTRODUCTION

Indoles and related heterocycles are considered to be the most privileged scaffolds as more than 200 indole based moieties are either marketed pharmaceuticals or under clinical trials.[1] In sharp contrast to the remarkable advancement in functionalizing the indoles at the C2 and C3 positions exploiting the inherent reactivity of the pyrrole ring,[2] attention for the functionalization on the benzenoid ring has gained very recently.[3] Particularly, owing to their

diverse biological activity profile that includes hMGMAT2 inhibition, antiproliferative and antiperoxidative properties, C7 substituted indoles are in high demand (Scheme 1).[4] In this regard, C–C bond formation reactions like arylation,[5] allylation,[6] alkenylation,[7] alkylation,[8] acylation[9] at the C7 position are well explored. Strikingly, despite the ubiquity of aromatics[10] having nitrogen-containing functional groups like sulfonamide,[10a-b] carboxamide,[10c-d] phosphoramidite[10e-f] in drugs, agrochemicals and organic materials, C7–N[11] bond formation reaction in indole scaffold has been less reported, presumably due to the less favored electrophilic nature of the nitrogen atom, However, indole based sulfonamide derivative indisulam[4g] (Scheme 1a), a clinical candidate for cancer therapy, potentiated the efforts towards the development of C7–N bond formation. For instance, Zhu et al.[11a] reported a ruthenium-catalyzed protocol for sulfonamidation using organic sulfonyl azides (Scheme 2b). Inspired by this, Chang et al.[11b-d] and others[11f,m] have developed methods for amidation to indoles and indolines using sulfonyl-, phosphoryl-, aryl-, alkyl-, and acyl azides. Interestingly, few of these Ir-catalysed protocols can be performed at room temperature.[11d,f] Very recently, azidoformates have been used for the synthesis of C7 amidated indoline derivatives, albeit again via Ir-catalysis.[11e] Anthranil[11h,j,k] and dioxazolone[11g,i,l] derivatives have also been successfully employed as aminating precursors for the indoline C7 functionalization (scheme 2c). Despite their efficiency in promoting the C7 amination, these protocols require expensive and toxic ruthenium and iridium based catalysts. Additionally, the aminating sources like anthranils, dioxazolones, azidoformates, tosyl-, aryl-, and phsophoryl azides used are either explosive or require multi-steps for their preparation. Very recently, Ackermann et al. reported C7–H chalcogenation[12] via copper catalysis. Inspired by the environmental and economical benefits of using 1st row transition metal catalysts, we have also developed copper catalyzed protocols for the indoline C7 acyloxylation[13] and imidation[11n] via cross-dehydrogenative coupling (CDC).

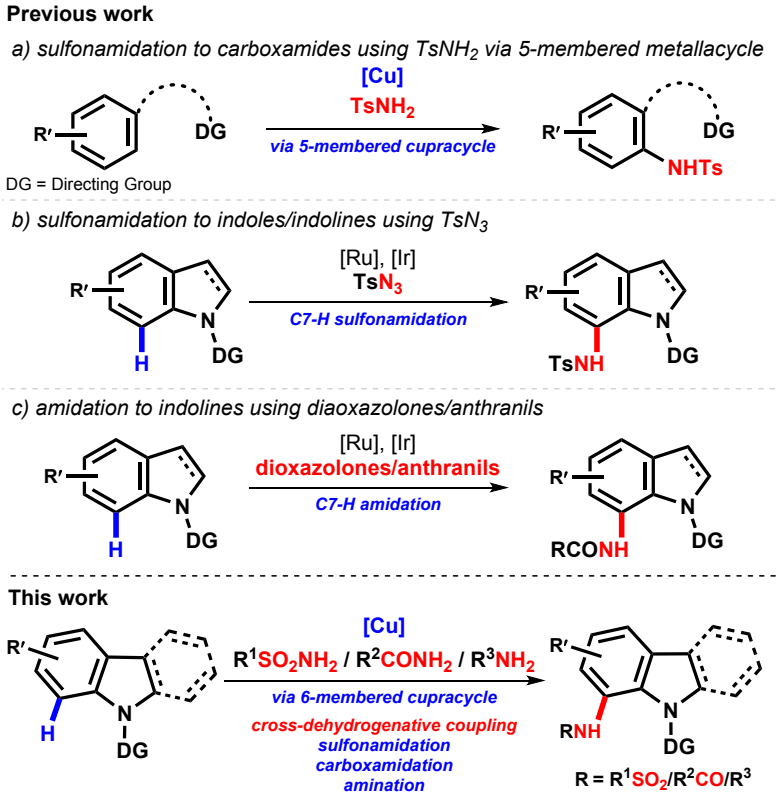
Scheme 1. C7 functionalized bioactive indole derivatives.



We, therefore, questioned whether similar copper catalyzed CDC protocol could be established using sulfonamide as the amidating source under aerobic condition. In this regard, Yu et al.[14] and others[15] have developed copper-catalyzed or –mediated protocols for amidation to arene carboxamides using $TsNH_2$ as aminating sources (Scheme 2a). However, the reaction proceeded through both kinetically and thermodynamically favoured five-membered cupracycle intermediate and use of tethered oxazoline as bidentate chelating ligand was obligatory for the mentioned outcome. On the other hand, kinetically less favorable six-membered cupracycle intermediate was not explored for amidation reaction.

Herein, we wish to disclose an aerobic copper mediated indoline C7–H amidation and amination protocol using sulfonamides, carboxamides, and anilines.

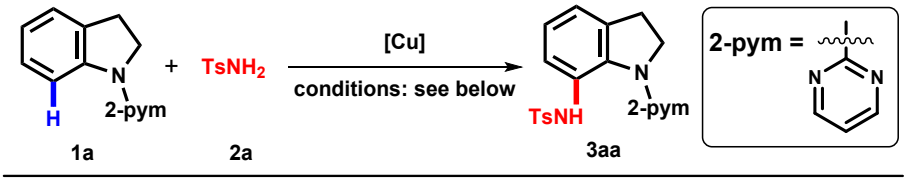
Scheme 2. Arene sulfonamidation using $TsNH_2$ and C7–H bond amidations of indolines.



RESULTS AND DISCUSSION

To optimize the reaction conditions, we employed *N*–pyrimidyl indoline (**1a**) as the model substrate and $TsNH_2$ (**2a**) as the amide source (Table 1). The optimization studies revealed that none of the copper salts was catalytically effective to provide the desired product in isolable yield (entries 1–13). However, although stoichiometric $Cu(OAc)_2$ furnished traces of product, use of basic additive afforded **3aa** in 20% isolated yield (entries 14–15). Thus, other inorganic and organic bases as additive were tested and 2,6-di-tertbutyl-4-methylpyridine proved to be the most effective (entries 16–21). Toluene was found to be the best solvent and 62% of **3aa** was formed at 140 °C (entries 22–23).

Table 1. Sulfonamidation reaction optimization[a]



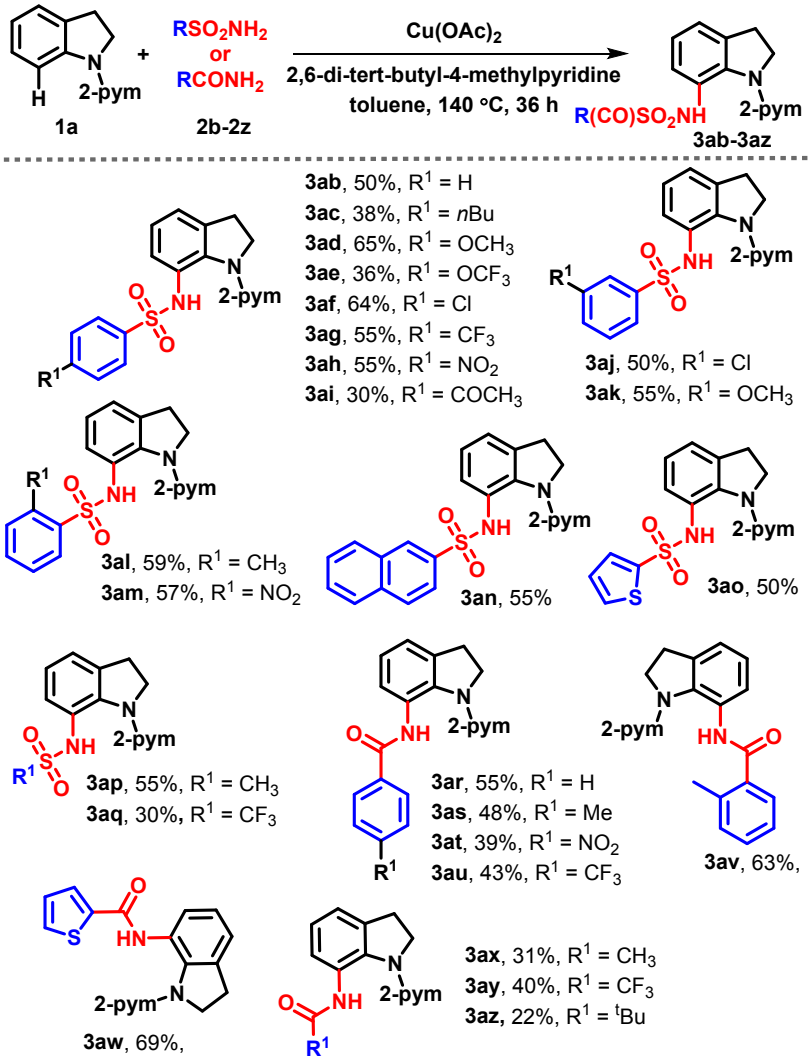
entry	Cu (equiv)	solvent	additive (equiv)	Temp (°C)	Yield[b] (%)
1	Cu_2O (0.3)	DCE	--	130	Trace
	Cu_2O (0.3)	DCE	Pivalic acid (1.0)	130	Trace
3	Cu(TC) (0.3)	DCE	--	130	Trace
4	Cu(TC) (0.3)	DCE	Pivalic acid (1.0)	130	5
5	CuBr (0.3)	DCE	--	130	Trace
6	$Cu(OBz)_2$ (0.3)	DCE	--	130	Trace
7	$Cu(OAc)_2$ (0.3)	DCE	--	130	Trace
8	$Cu(OAc)_2$ (0.3)	$CHCl_3$	--	130	Trace
9	$Cu(OAc)_2$ (0.3)	DCE	Na_2CO_3 (1.0)	130	10
10	$Cu(OAc)_2$ (0.3)	DCB	Na_2CO_3 (1.0)	130	15
11	$Cu(OAc)_2$ (0.3)	DCB:Toluene (1:1)	Na_2CO_3 (1.0)	130	13
12	$Cu(OAc)_2$ (0.3)	DMSO	Na_2CO_3 (1.0)	130	Trace
13	$Cu(OAc)_2$ (0.3)	DMF	Na_2CO_3 (1.0)	130	Trace
14	$Cu(OAc)_2$ (1.0)	DCE	--	130	Traces
15	$Cu(OAc)_2$ (1.0)	DCE	Na_2CO_3 (1.0)	130	20%
16	$Cu(OAc)_2$ (1.0)	DCB	Na_2CO_3 (1.0)	130	30%
17	$Cu(OAc)_2$ (1.0)	DCB	Ag_2SO_4 (1.0)	130	20%
18	$Cu(OAc)_2$ (1.0)	DCB	DMAP (1.0)	130	20%
19	$Cu(OAc)_2$ (1.0)	DCB	B1 (1.0)	130	26%
20	$Cu(OAc)_2$ (1.0)	DCB	B2 (1.0)	130	23%
21	$Cu(OAc)_2$ (1.0)	DCB	B3 (1.0)	130	36%
22	$Cu(OAc)_2$ (1.0)	Toluene	B3 (1.0)	130	42%
23	**$Cu(OAc)_2$ (1.0)**	**Toluene**	**B3 (1.0)**	**140**	**62%**
24	$Cu(OAc)_2$ (1.5)	Toluene	B3 (1.0)	140	55%
25	$Cu(OAc)_2$ (2.0)	Toluene	B3 (1.0)	140	50%
26[c]	$Cu(OAc)_2$ (1.0)	Toluene	B3 (1.0)	140	57%
27	$Cu(OAc)_2$ (1.0)	Toluene	B3 (1.5)	140	50%
28	$Cu(OAc)_2$ (1.0)	Toluene	B3 (2.0)	140	47%
29[d]	$Cu(OAc)_2$ (1.0)	Toluene	B3 (1.0)	140	63%
30[e]	$Cu(OAc)_2$ (1.0)	Toluene	B3 (1.0)	140	38%
31	$Cu(OAc)_2$ (0.2)	Toluene	B3 (1.0)	140	27%
32	$Cu(OAc)_2$ (0.3)	Toluene	B3 (1.0)	140	42%
33	$Cu(OAc)_2$ (0.4)	Toluene	B3 (1.0)	140	50%

[a]Reaction Conditions: **1a** (0.25 mmol), **2a** (0.3 mmol), solvent (2.5 mL), air, 30 h. [b]Isolated yield. [c]**2a** (0.37 mmol), [d]under O_2, [e]under Ar; B1=2,6-dimethylpyridine, B2=2,4,6-trimethylpyridine, B3=2,6-di-tertbutyl-4-methylpyridine

The yield of the product could not be significantly improved by varying either the equivalent of salt, or **2a**, or additives (entries 24–28). Instead of air, oxygen atmosphere was not helpful to improve the yield (entry 29). However, low yield of **3aa** was obtained under an inert atmosphere (entry 30). Unfortunately, efforts to implement catalytic use of copper salts did not provide satisfactory yields (entries 31–33).

Having optimized reaction conditions in hand, we first tested the scope and limitation of this sulfonamidation protocol with respect to the various sulfonamide derivatives (Scheme 3). In general, the reaction was found to be tolerant of diverse substitutions on the sulfonamide scaffold. As shown in Scheme 3, a series of sulfonamides bearing electron donating and electron withdrawing substituents were coupled with indoline derivative **1a** to furnish the desired products (**3ab**–**3am**) in good to moderate yields. Substitution pattern had very little impact on the yield of the products as *ortho*-, *meta*- and *para*-substituted sulfonamide components furnished the products with similar yields (**3ah**, **3am**; **3ad, 3ak**). Halogenated sulfonamides (**3af**, **3ag**, **3aj**) were also compatible with this protocol. Gratifyingly, the scope of this reaction could be extended for the naphthyl (**3an**), heteroaryl (**3ao**) and alkyl (**3ap**, **3aq**) sulfonamide derivatives. The formation of C7 sulfonamide derivative was unambiguously confirmed by X-ray analysis of **3ah** (CCDC 1917173). Subsequently, we wondered whether this amidation protocol could be applied for the carboxamide derivative as well. To our delight, carboxamides were found to be suitable coupling partner and the products (**3ar**–**3az**) were obtained in good to moderate yields (69–22%). Notably, thiophene-2-carboxamide, acetamide and trifluoroacetamide were also coupled with the indoline scaffold.

Scheme 3. Scope of sulfonamides and carboxamides[a]

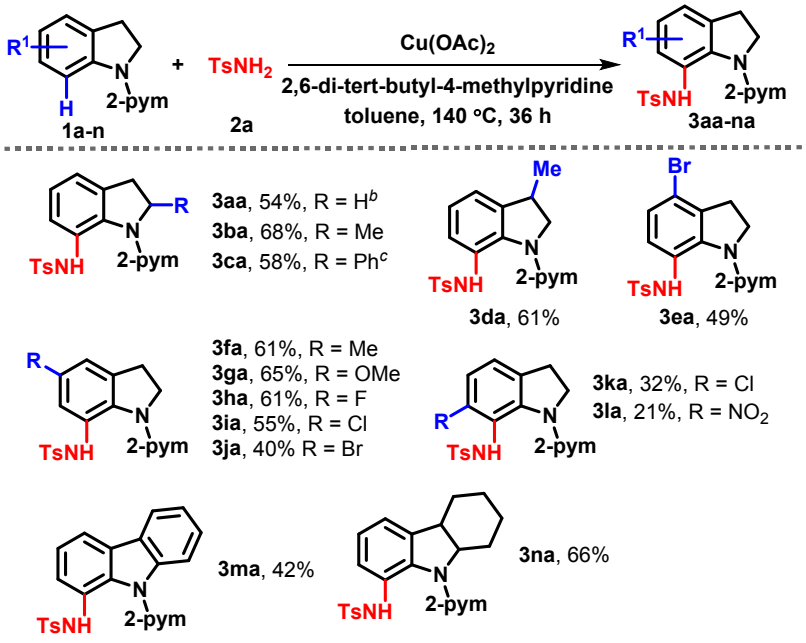


[a]Reaction conditions: **1a** (0.25 mmol), **2b–2z** (0.3 mmol), $Cu(OAc)_2$ (0.25 mmol), 2,6-ditertbutyl-4-methylpyridine (0.25 mmol), Toluene (2.5 mL), 140 ºC, 36 h, isolated yields

The scope of the indoline substrates was next explored using **2a** as the coupling counterpart. As shown in Scheme 4, various substituents at the C2, C3, C4, C5, and C6 positions on the indoline moiety were very well tolerated. Under the optimized conditions, indoline moieties containing methyl (**3ba**, **3da**, **3fa**), phenyl (**3ca**), methoxy (**3ga**), fluoro (**3ha**), chloro (**3ia**, **3ka**), and bromo (**3ea**, **3ja**) were successfully coupled with **2a** in moderate to good yields. Unfortunately, indolines containing strong electron-withdrawing substituent, such as nitro, furnished poorly yielded products (**3la**). The title reaction was also applicable for carbazole and hexahydrocarbazole derivatives and the products (**3ma**, **3na**) were obtained in good

yields. The reaction was also conducted in preparatory scale using **1a** and **2a**, and the product **3aa** was obtained in 54% yield.

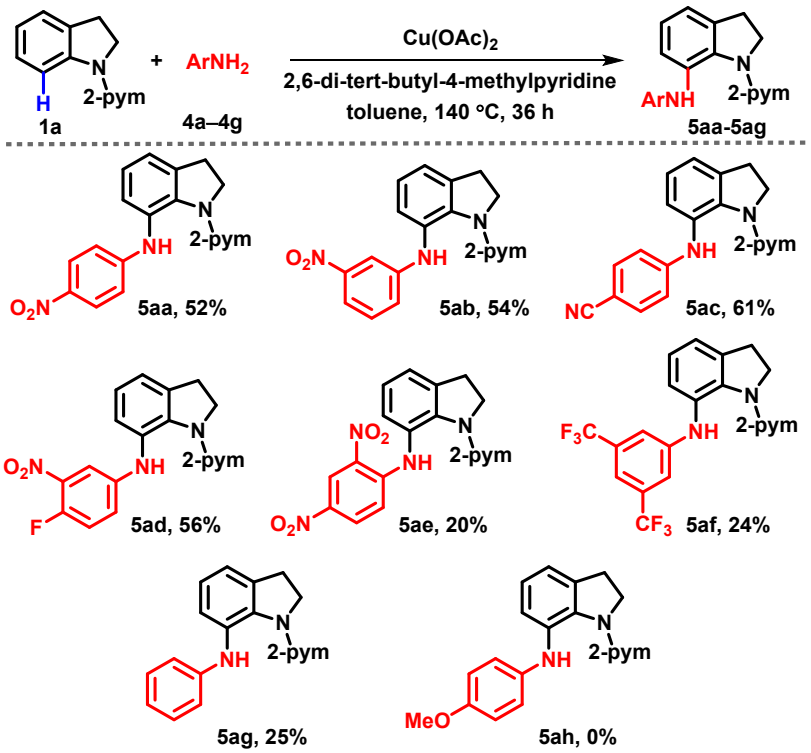
Scheme 4. Scope of indolines[a]



[a]Reaction Conditions:. **1a–1n** (0.25 mmol), **2a** (0.3 mmol), $Cu(OAc)_2$ (0.25 mmol), 2,6-ditertbutyl-4-methylpyridine (0.25 mmol), Toluene (2.5 mL), 140 ºC, 36 h, isolated yields. [b]preparative scale reaction, [c]48h

In view of the medicinal significance of *N*-arylanilines,[16] we tested the feasibility of aniline derivatives as the coupling partner (Scheme 5). To our delight, a wide range of electron-deficient anilines were coupled with **1a**. For instances, nitroanilines, aminobenzonitriles, fluorinated anilines provided the corresponding products (**5aa**–**5ag**) in 61–20%. However, although aniline furnished the desired product in 25% yield, electronically rich precursor (4-methoxyaniline) did not furnish any desired product.

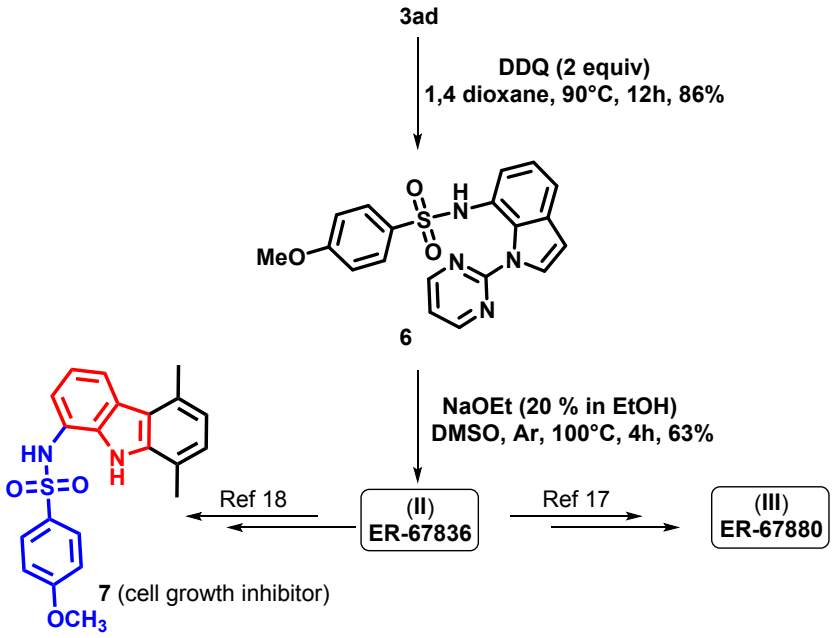
Scheme 5. Scope of anilines[a]



[a]Reaction Conditions:. **1a** (0.25 mmol), **4a–4f** (0.3 mmol), $Cu(OAc)_2$ (0.25 mmol), 2,6-ditertbutyl-4-methylpyridine (0.25 mmol), Toluene (2.5 mL), 140 ºC, 36 h, isolated yields

Finally, to demonstrate the utility of this amidation, the antiproliferative agent ER-67836 (**II**) was synthesized from **3ad** in two steps (Scheme 6). ER-67836 can be further converted to either ER-67880[17] (**III**) or cell growth inhibitor (**7**)[18] via reported methods.

Scheme 6. Synthetic application



CONCLUSION

In conclusion, we have developed copper (II)-mediated indoline C7–H sulfonamidation, carboxamidation and amination using sulfonamides, carboxamides and anilines directly. This is the first general method for the amidation to indolines at the C7 position via CDC protocol using non-explosive, non-toxic and readily available precursors.

EXPERIMENTAL SECTION

A. General Information.

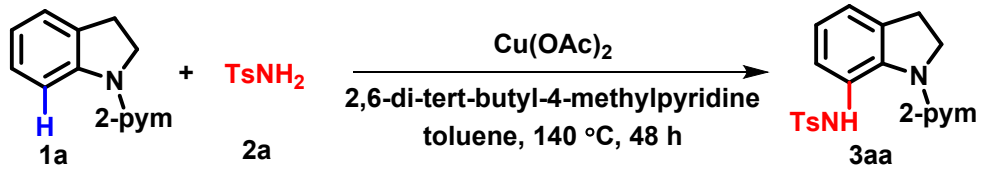
Reactions were performed using borosil sealed tube vial with dry solvents under anhydrous conditions, unless otherwise noted. Anhydrous 1,2-dichloroethane (DCE) and toluene were used. Ethyl acetate (EtOAc), dichloromethane (DCM) and petroleum ether were purchased commercially and were used without further purification, unless otherwise stated. Column chromatography was done in 60Å-120Å silica gel of Merck Company. All spectra 1H NMR, 13C NMR, recorded on Bruker AV 400 MHz spectrometer in CDCl3 using as internal standards the residual CHCl3 for 1H NMR (δ = 7.26 ppm) and the deuterated solvent signal

for 13C NMR (δ = 77.16 ppm). The following abbreviations were used to describe peak splitting patterns when appropriate: s = singlet, d = doublet, t = triplet, q = quartet, dd = doublet of doublet, m = multiplet. Coupling constants, J, were reported in Hertz (Hz). HRMS analysis was performed using Q-TOF mass spectrometer of the SAIF Division in CSIR-CDRI Lucknow. IR analysis was also performed in SAIF Division. Reagents and starting materials were purchased from Aldrich, Alfa Aesar and other commercial sources and used without further purification unless otherwise noted. The indoline pyrimidine derivatives **(1a-1n)**[19-20] as the precursors were prepared via reported methods.

B. General procedure for the synthesis of Sulfonamidation, Amidation and Amination: To a solution of indoline pyrimidine (0.25 mmol) in toluene (2.5 mL), $Cu(OAc)_2$ (0.25 mmol), 2,6-di-tert-butyl-4-methylpyridine (0.25 mmol) and sulfonamide/carboxamides/anilines (0.30 mmol) was added in sealed tube vial and the reaction mixture was kept at 140 ˚C in preheated oil bath for 36 hours. After completion of the reaction, reaction mixture was allowed to cool at room temperature. Diluted with DCM (5 mL) and filtered through a silica pad. The silica pad was washed with DCM (2 X 10 mL). The combined organic layer was evaporated under reduced pressure. Crude mixture was purified by silica gel column chromatography to yield the corresponding C7 amidated product.

C. Gram scale synthesis of 3aa: To a solution of indoline pyrimidine **1a** (1g, 5.0 mmol) in toluene (20 mL), $Cu(OAc)_2$ (5.0 mmol), 2,6-di-tert-butyl-4-methylpyridine (5.0 mmol) and p-toluenesulfonamide (6.0 mmol) was added in sealed tube vial and the reaction mixture was kept at 140 ˚C for 48 hours. After completion of the reaction, reaction mixture was allowed to cool at room temperature. Diluted with DCM (50 mL) and filtered through a silica pad. The combined organic layer was evaporated under reduced pressure. Crude mixture was purified

by silica gel column chromatography to yield the corresponding C7 amidated product **3aa** 992 mg, 54%).



4-methyl-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3aa): 3aa was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3aa** (57 mg, 62%) as a white solid. **R_f**: 0.41 (silica gel, 30% DCM); **M. P.:** 152−157 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2955, 2873, 1549, 1455, 1330, 1250, 1209, 1161, 1087, 1017; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.86 (s, 1H), 8.46 (d, J = 4.6 Hz, 2H), 7.42−7.35 (m, 1H), 7.14 (d, J = 8.1 Hz, 2H), 7.09−7.04 (m, 2H), 7.00 (d, J = 8.1 Hz, 2H), 6.74 (t, J = 4.7 Hz, 1H), 3.88 (t, J = 8.0 Hz, 2H), 2.92 (t, J = 8.0 Hz, 2H), 2.32 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 142.9, 137.3, 137.1, 135.6, 129.0, 127.2, 126.7, 125.0, 124.7, 123.0, 111.5, 51.1, 28.2, 21.5; **HRMS (ESI)**: calcd for $C_{19}H_{19}N_4O_2S^+$ $[M+H]^+$ 367.1223, found 367.1222.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide(3ab): 3ab** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2b** (47 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afforded **3ab** (44 mg, 50%) as a white solid. **R_f**: 0.41 (silica gel, DCM); **M. P.:** 153−158 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2954, 2852, 2361, 1576, 1558, 1507, 1472, 1419, 1386, 1260, 1087, 907; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.88 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.44−7.37 (m, 2H), 7.26−7.18 (m, 4H), 7.10−7.05 (m, 2H), 6.74 (t, J = 4.8 Hz, 1H), 3.85 (t, J = 8.1 Hz, 2H), 2.91 (t, J = 8.2 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz,**

$CDCl_3$): δ 157.7, 140.2, 137.2, 135.6, 132.3, 128.4, 127.5, 126.6, 124.8, 124.7, 123.2, 111.5, 51.2, 28.1; **HRMS (ESI)**: calcd for $C_{18}H_{17}N_4O_2S^+$ $[M+H]^+$ 353.1067 found 353.1063.

4-butyl-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ac): 3ac was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2c** (63 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ac** (39 mg, 38%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 110−115 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2951, 2935, 2358, 1580, 1465, 1378, 1330, 1255, 1159, 1118, 1087, 1016, 992; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.86 (s, 1H), 8.45 (d, J = 4.8 Hz, 2H), 7.42−7.35 (m, 1H), 7.15 (d, J = 8.2 Hz, 2H), 7.10−7.03 (m, 2H), 6.99 (d, J = 8.2 Hz, 2H), 6.73 (t, J = 4.8 Hz, 1H), 3.87 (t, J = 8.2 Hz, 2H), 2.90 (t, J = 8.0 Hz, 2H), 2.57 (t, J = 7.7 Hz, 2H), 1.60−1.49 (m, 2H), 1.40−1.23 (m, 2H), 0.92 (t, J = 7.3 Hz, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 147.8, 137.4, 137.2, 135.5, 128.4, 127.4, 126.7, 125.0, 124.7, 123.0, 111.5, 51.1, 35.5, 33.3, 28.2, 22.3, 13.9; **HRMS (ESI)**: calcd for $C_{22}H_{25}N_4O_2S^+$ $[M+H]^+$ 409.1693 found 409.1692.

4-methoxy-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ad): 3ad was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2d** (56 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ad** (63 mg, 65%) as a orange solid. **R_f**: 0.40 (silica gel, DCM); **M. P.:** 175−180 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2981, 2357, 2323, 1558, 1507, 1488, 1435, 1396, 1155, 950; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.83 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.41−7.35 (m, 1H), 7.19 (d, J = 9.0 Hz, 2H), 7.08−7.03 (m, 2H), 6.74 (t, J = 4.8 Hz, 1H), 6.67 (d, J = 9.0 Hz, 2H), 3.94 (t, J = 8.3 Hz, 2H), 3.79 (s, 3H), 2.93 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 162.6, 157.9, 157.8, 137.1, 135.6, 132.0, 128.8, 127.2, 125.1, 124.7, 123.0, 113.6, 111.5, 55.7, 51.2, 28.2; **HRMS (ESI)**: calcd for $C_{19}H_{19}N_4O_3S^+$ $[M+H]^+$ 383.1172 found 383.1174.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)-4-(trifluoromethoxy)benzenesulfonamide (3ae): 3ae** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2e** (73 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 10% EtOAc/Hexane to afford **3ae** (40 mg, 36%) as a yellow solid. $\mathbf{R_f}$: 0.66 (silica gel, 30% EtOAc/Hexane); **M. P.:** 105−110 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3648, 2364, 1684, 1558, 1540, 1507, 826, 790, 778; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.07 (s, 1H), 8.47 (d, J = 4.8 Hz, 2H), 7.41−7.36 (m, 1H), 7.31−7.26 (m, 2H), 7.09 (d, J = 5.4 Hz, 2H), 7.05−7.00 (m, 2H), 6.76 (t, J = 4.8 Hz, 1H), 3.90 (t, J = 8.4 Hz, 2H), 2.93 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 151.8, 138.6, 137.2, 135.7, 128.8, 127.5, 124.9, 124.3, 12.5, 120.3 (q, J = 260.0 Hz), 120.4, 111.7, 51.1, 28.1; **HRMS (ESI)**: calcd for $C_{19}H_{16}F_3N_4O_3S^+$ $[M+H]^+$ 437.0890 found 437.0886.

4-chloro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3af): 3af was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2f** (57 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3af** (62 mg, 64%) as a orange solid. $\mathbf{R_f}$: 0.41 (silica gel, DCM); **M. P.:** 148−153 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2980, 2970, 2360, 1583, 1508,1458, 1337, 1273,1166, 1091; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.04 (s, 1H), 8.48 (d, J = 4.6 Hz, 2H), 7.37 (t, J = 4.2 Hz, 1H), 7.24−7.12 (m, 4H), 7.07 (d J = 5.7 Hz, 2H), 6.76 (t, J = 4.6 Hz, 1H), 3.93 (t, J = 7.9 Hz, 2H), 2.94 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 138.7, 138.6, 137.2, 135.7, 128.6, 128.2, 127.2, 124.8, 124.5, 123.4, 111.7, 51.2, 28.2; **HRMS (ESI)**: calcd for $C_{18}H_{16}ClN_4O_2S^+$ $[M+H]^+$ 387.0677 found 387.0673.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)-4-(trifluoromethyl)benzenesulfonamide (3ag): 3ag** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2g** (67 mg, 0.30 mmol). The crude reaction mixture was purified by

column chromatography using 10% EtOAc/Hexane afforded **3ag** (58 mg, 55%) as a yellow solid. **R_f**: 0.62 (silica gel, 30% EtOAc/Hexane); **M. P.:** 169−174 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2979, 2358, 2342, 1579, 1551, 1454, 1319, 1280, 1164, 1065, 1014, 999; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.19 (s, 1H), 8.47 (d, J = 4.8 Hz, 2H), 7.47 (d, J = 8.3 Hz, 2H), 7.42−7.34 (m, 3H), 7.09 (d, J = 5.3 Hz, 2H), 6.77 (t, J = 4.8 Hz, 1H), 3.85 (t, J = 8.0 Hz, 2H), 2.92 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 143.7, 137.2, 135.8, 134.0 (q, $J_{C\text{-}F}$ = 33.6 Hz), 127.3, 127.2, 125.5 (q, $J_{C\text{-}F}$ = 3.7 Hz), 124.9, 124.2, 123.5, 123.2 (q, $J_{C\text{-}F}$ = 272 Hz), 111.7, 51.2, 28.1; **HRMS (ESI)**: calcd for $C_{19}H_{16}F_3N_4O_2S^+$ $[M+H]^+$ 421.0941 found 421.0940.

4-nitro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ah): 3ah was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2h** (60 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ah** (55 mg, 55%) as a yellow solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 185−190 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2979, 2358, 2323, 1582, 1553,1507,1469, 1375, 1253, 1167, 1066, 992; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.38 (s, 1H), 8.47 (d, J = 4.7 Hz, 2H), 8.05 (d, J = 8.6 Hz, 2H), 7.53−7.33 (m, 3H), 7.18−7.04 (m, 2H), 6.79 (t, J = 4.7 Hz, 1H), 3.87 (t, J = 8.0 Hz, 2H), 2.95 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.7, 149.8, 146.0, 137.0, 135.8, 127.9, 127.1, 125.1, 123.9, 123.7, 123.6, 111.9, 51.4, 28.1; **HRMS (ESI)**: calcd for $C_{18}H_{16}N_5O_4S^+$ $[M+H]^+$ 398.0918 found 398.0918.

4-acetyl-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ai): 3ai was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2i** (59 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ai** (30 mg, 30%) as a white solid. **R_f**: 0.55 (silica gel, DCM); **M. P.:** 120−125 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2966, 2360, 2320, 1557,

1541, 1507, 1488, 1417, 1338, 1161, 831; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.20 (s, 1H), 8.47 (d, J = 4.8 Hz, 2H), 7.77 (d, J = 8.3 Hz, 2H), 7.44−7.32 (m, 3H), 7.08 (d, J = 5.3 Hz, 2H), 6.76 (t, J = 4.8 Hz, 1H), 3.85 (t, J = 8.2 Hz, 2H), 2.92 (t, J = 8.1 Hz, 2H), 2.58 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 196.9, 157.8, 144.2, 139.7, 137.0, 135.7, 128.2, 127.1, 127.0, 124.9, 124.3, 123.4, 111.7, 51.2, 28.1, 27.0; **HRMS (ESI)**: calcd for $C_{20}H_{19}N_4O_3S^+$ $[M+H]^+$ 395.1172 found 395.1170.

3-chloro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3aj): 3aj was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2j** (57 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3aj** (49 mg, 50%) as a orange solid. $\mathbf{R}_f$: 0.50 (silica gel, DCM); **M. P.:** 132−137 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3295, 2359, 2329, 1582, 1550, 1507, 1466, 1335, 1318, 1161, 811, 787; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.01 (s, 1H), 8.47 (d, J = 4.8 Hz, 2H), 7.41−7.35 (m, 2H), 7.19−7.07 (m, 5H), 6.76 (t, J = 4.8 Hz, 1H), 3.92 (t, J = 8.4 Hz, 2H), 2.96 (t, J = 8.2 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.7, 141.9, 137.3, 135.7, 134.8, 132.3, 129.6, 127.8, 126.6, 124.9, 124.8, 124.2, 111.7, 51.4, 28.1; **HRMS (ESI)**: calcd for $C_{18}H_{16}ClN4O_2S^+$ $[M+H]^+$ 387.0677 found 387.0678.

3-methoxy-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ak): 3ak was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2k** (56 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ak** (53 mg, 55%) as a orange solid. $\mathbf{R}_f$: 0.50 (silica gel, DCM); **M. P.:** 110−115 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2953, 2852, 1592, 1557, 1507, 1457, 1418, 1396, 1319, 1285, 1259, 1184, 1078; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.85 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.44−7.38 (m, 1H), 7.14−7.06 (m, 3H), 6.97−6.91 (m, 1H), 6.84−6.79 (m, 1H), 6.74 (t, J = 4.8 Hz, 1H), 6.70 (dd, J = 1.7 Hz, 0.7 Hz, 1H), 3.89 (t, J = 8.1 Hz, 2H), 3.57 (s, 3H), 2.93 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100**

MHz, $CDCl_3$): δ 159.4, 157.7, 141.1, 137.4, 135.5, 129.4, 127.6, 124.8, 124.7, 123.2, 119.4, 118.8, 111.5, 110.6, 55.4, 51.2, 28.1; **HRMS (ESI)**: calcd for $C_{19}H_{19}N_4O_3S^+$ $[M+H]^+$ 383.1172 found 383.1169.

2-methyl-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3al): 3al was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2l** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3al** (54 mg, 59%) as a yellow solid. **R_f**: 0.41 (silica gel, DCM); **M. P.:** 110−115 ˚C; **IR (in $CHCl_3$, cm^{-1}):** v_{max}; 3217, 2364, 2321, 1556, 1507, 1457, 1316, 1212, 1105, 1089, 1006; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.90 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.55 (d, J = 8.1 Hz, 1H), 7.36−726 (m, 2H), 7.13 (d, J = 7.5 Hz, 1H), 7.10−6.98 (m, 3H), 6.74 (t, J = 4.8 Hz, 1H), 4.02 (t, J = 8.2 Hz, 2H), 2.94 (t, J = 8.1 Hz, 2H), 2.19(s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.3, 157.9, 138.7, 137.4, 136.6, 135.8, 132.4, 132.2, 129.3, 125.9, 125.4, 124.9, 122.5, 111.6, 51.2, 28.3, 20.2; **HRMS (ESI)**: calcd for $C_{19}H_{19}N_4O_2S^+$ $[M+H]^+$ 367.1223 found 367.1221.

2-nitro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3am): 3am was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2m** (60 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3am** (57 mg, 57%) as a yellow solid. **R_f**: 0.51 (silica gel, DCM); **M. P.:** 219−224 ˚C; **IR (in $CHCl_3$, cm^{-1}):** v_{max}; 2916, 1580, 1555, 1462, 1384, 1330, 1293, 1252, 1174, 1127, 1085, 997; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.87 (s, 1H), 8.51 (d, J = 4.8 Hz, 2H), 7.71−7.57 (m, 3H), 7.55−7.46 (m, 1H), 7.37−7.32 (m, 1H), 7.09 (d, J = 5.2 Hz, 2H), 6.79 (t, J = 4.8 Hz, 1H), 4.05 (t, J = 8.2 Hz, 2H), 2.97 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.9, 158.2, 147.5, 137.2, 135.9, 133.9, 131.7, 125.5, 125.1, 125.0, 124.6, 122.9, 112.3, 51.3, 28.7; **HRMS (ESI)**: calcd for $C_{18}H_{16}N_5O_4S^+$ $[M+H]^+$ 398.0918 found 398.0917.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)naphthalene-2-sulfonamide (3an): 3an** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2n** (62 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3an** (56 mg, 55%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 219−224 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2365, 1580, 1516, 1507, 1455, 1397, 1313, 1254, 1204, 1144, 1107, 990; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.00 (s, 1H), 8.41 (d, J = 4.6 Hz, 2H), 7.86−7.74 (m, 2H), 7.65 (d, J = 8.5 Hz, 2H), 7.58 (t, J = 7.6 Hz, 1H), 7.54−7.47 (m, 1H), 7.43 (d, J = 7.6 Hz, 1H), 7.23 (d, J = 9.2 Hz, 1H), 7.12−6.98 (m, 2H), 6.73 (t, J = 4.7 Hz, 1H), 3.48 (t, J = 8.1 Hz, 2H), 2.76 (t, J = 8.1 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.6, 137.2, 136.9, 135.5, 134.6, 132.0, 129.0, 128.6, 128.5, 127.9, 127.8, 127.4, 127.2, 124.8, 124.7, 123.2, 122.1, 111.5, 50.8, 28.0; **HRMS (ESI)**: calcd for $C_{22}H_{19}N_4O_2S^+$ $[M+H]^+$ 403.1223 found 403.1219.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)thiophene-2-sulfonamide (3ao): 3ao** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2o** (48 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ao** (45 mg, 50%) as a yellow solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 150−155 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2980, 2357, 2343, 2311, 1583, 1507, 1457, 1449, 1372, 1312, 1252, 1111; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.20 (s, 1H), 8.47 (d, J = 4.8 Hz, 2H), 7.45−7.39 (m, 1H), 7.37 (dd, J = 5.0 Hz, 1.3 Hz, 1H), 7.13−7.08 (m, 2H), 6.95 (dd, J = 3.7 Hz, 1.3 Hz, 1H), 6.85 (dd, J = 5.0 Hz, 3.7 Hz, 1H), 6.75 (t, J = 4.8 Hz, 1H), 4.04 (t, J = 8.3 Hz, 2H), 2.98 (t, J = 8.2 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 141.0, 137.2, 135.7, 131.5, 131.4, 127.4, 127.0, 124.7, 124.5, 123.4, 111.6, 51.3, 22.2; **HRMS (ESI)**: calcd for $C_{16}H_{15}N_4O_2S_2^+$ $[M+H]^+$ 359.0631 found 359.0629.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)methanesulfonamide (3ap): 3ap** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2p** (28 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3ap** (40 mg, 55%) as a white solid. $\mathbf{R}_f$: 0.60 (silica gel, 30% EtOAc/Hexane); **M. P.:** 167−172 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2359, 2345, 1582, 1456, 1445, 1385, 1321, 1271, 1166, 989; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.00 (s, 1H), 8.49 (d, J = 4.8 Hz, 2H), 7.44−7.39 (m, 1H), 7.14−7.07 (m, 2H), 6.77 (t, J = 4.8 Hz, 1H), 4.46 (t, J = 8.4 Hz, 2H), 3.14 (t, J = 8.0 Hz, 2H), 2.74 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.8, 158.0, 136.3, 136.2, 125.8, 125.2, 124.7, 122.6, 112.0, 51.6, 39.4, 28.4; **HRMS (ESI)**: calcd for $C_{13}H_{15}N_4O_2S^+$ $[M+H]^+$ 291.0910 found 291.0907.

1,1,1-trifluoro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)methanesulfonamide (3aq): 3aq was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), sulfonamide **2q** (44 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 10% EtOAc/Hexane to afford **3aq** (26 mg, 30%) as a white solid. $\mathbf{R}_f$: 0.60 (silica gel, 30% EtOAc/Hexane); **M. P.:** 97−103 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3010, 2926, 1593, 1555, 1484, 1419, 1376, 1288, 1226, 1186, 1115; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 13.38 (s, 1H), 8.48 (d, J = 4.8 Hz, 2H), 7.36 (dd, J = 7.9 Hz, 1.2 Hz, 1H), 7.16−7.06 (m, 2H), 6.78 (t, J = 4.8 Hz, 1H), 4.47 (t, J = 8.3 Hz, 2H), 3.14 (t, J = 8.1 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.1, 136.2, 125.2, 124.2, 123.4, 123.3, 120.2 (q, $J_{C\text{-}F}$ = 324 Hz), 111.7, 51.4, 28.2; **HRMS (ESI)**: calcd for $C_{13}H_{12}F_3N_4O_2S^+$ $[M+H]^+$ 345.0628 found 345.0625.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzamide (3ar): 3ar** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2r** (37 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3ar** (44 mg, 55%) as a yellow solid. $\mathbf{R}_f$: 0.50 (silica gel, 30%

EtOAc/Hexane); **M. P.:** 151−156 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3018, 1615, 1583, 1553, 1422, 1379, 1214, 1107, 1068, 995; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.41 (s, 1H), 8.43 (d, *J* = 4.8 Hz, 2H), 7.93 (d *J* = 8.0 Hz, 1H), 7.88−7.80 (m, 2H), 7.51−7.45 (m, 1H), 7.44−7.38 (m, 2H), 7.15 (t, *J* = 7.8 Hz, 1H), 7.06 (dd, *J* = 7.2 Hz, 1.0 Hz, 1H), 6.70 (t, *J* = 4.8 Hz, 1H), 4.46 (t, *J* = 8.3 Hz, 2H), 3.10 (t, *J* = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 165.9, 159.5, 157.9, 136.2, 136.0, 134.7, 131.4, 128.5, 127.4, 127.3, 124.7, 123.9, 121.3, 111.5, 52.0, 28.8; **HRMS (ESI)**: calcd for $C_{19}H_{17}N_4O^+$ $[M+H]^+$ 317.1397 found 317.1393.

4-methyl-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzamide (3as): 3as was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2s** (41 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3as** (40 mg, 48%) as a orange solid. **R_f**: 0.51 (silica gel, 30% EtOAc/Hexane); **M. P.:** 192−196 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3008, 2361, 1749, 1656, 1584, 1460, 1423, 1316, 1224, 1061, 832, 796; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.29 (s, 1H), 8.44 (d, *J* = 4.8 Hz, 2H), 7.91 (d *J* = 8.0 Hz, 1H), 7.73 (d *J* = 8.0 Hz, 2H), 7.22 (d *J* = 7.7 Hz, 2H), 7.15 (t, *J* = 7.9 Hz, 1H), 6.06 (dd, *J* = 7.3 Hz, 1.1 Hz, 1H), 6.71 (t, *J* = 4.8 Hz, 1H), 4.46 (t, *J* = 8.0 Hz, 2H), 3.10 (t, *J* = 8.0 Hz, 2H), 2.39 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 165.8, 159.5, 157.9, 141.8, 136.0, 134.7, 133.4, 129.2, 127.4, 124.7, 123.9, 121.2, 111.5, 52.0, 28.9, 21.6; **HRMS (ESI)**: calcd for $C_{20}H_{19}N_4O^+$ $[M+H]^+$ 331.1553 found 331.1546.

4-nitro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzamide (3at): 3at was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2t** (50 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3at** (36 mg, 39%) as a yellow solid. **R_f**: 0.41 (silica gel, 30% EtOAc/Hexane); **M. P.:** 206−211 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3007, 2925, 1668, 1585, 1527, 1461, 1347, 1282, 1107, 1015, 995. **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.86 (s, 1H), 8.43

(d, J = 4.8 Hz, 2H), 8.82 (d J = 8.7 Hz, 2H), 7.99 (d, J = 8.7 Hz, 2H), 7.92 (d, J = 8.1 Hz, 1H), 7.18 (t, J = 7.7 Hz, 1H), 7.10 (d, J = 6.6 Hz, 1H), 6.74 (t, J = 4.8 Hz, 1H), 4.49 (t, J = 8.2 Hz, 2H), 3.13 (t, J = 8.1 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 163.7, 159.3, 157.9, 149.6, 142.0, 136.3, 134.7, 128.5, 126.5, 124.8, 123.8, 123.7, 121.9, 111.7, 51.9, 28.7; **HRMS (ESI)**: calcd for $C_{19}H_{16}N_5O_3^+$ $[M+H]^+$ 362.1248 found 362.1243.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)-4-(trifluoromethyl)benzamide (3au): 3au** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2u** (57 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 10% EtOAc/Hexane to afford **3au** (41 mg, 43%) as a white solid. **R_f**: 0.62 (silica gel, 30% EtOAc/Hexane); **M. P.:** 149−154 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3009, 2926, 1733, 1669, 1554, 1459, 1379, 1282, 1133, 1067, 995; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.66 (s, 1H), 8.43 (d, J = 4.8 Hz, 2H), 7.99−7.88 (m, 3H), 7.69 (d, J = 8.4 Hz, 2H), 7.17 (t, J = 7.7 Hz, 1H), 7.09 (dd, J = 7.2 Hz, 1.0 Hz, 1H), 6.74 (t, J = 4.8 Hz, 1H), 4.48 (t, J = 7.9 Hz, 2H), 3.12 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 164.5, 159.4, 157.9, 139.6, 136.2, 134.7, 133.2 (q, J_{CF} = 32.3 Hz), 127.9, 126.8, 125.6 (q, J_{CF} = 3.3 Hz), 123.9, (q, J_{CF} = 271.0 Hz), 123.8, 121.7, 111.7, 52.0, 28.8; **HRMS (ESI)**: calcd for $C_{20}H_{16}F_3N_4O^+$ $[M+H]^+$ 385.1271 found 385.1271.

2-methyl-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)benzamide (3av): 3av was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2v** (41 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3av** (53 mg, 63%) as a white solid. **R_f**: 0.41 (silica gel, 30% EtOAc/Hexane); **M. P.:** 144−149 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3007, 2925, 1663, 1584, 1553, 1458, 1326, 1282, 1225, 1188, 995; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.42 (s, 1H), 8.23 (d, J = 4.8 Hz, 2H), 8.04 (d, J = 8.2 Hz, 1H), 7.44 (d, J = 7.3 Hz, 1H), 7.30 (td, J = 7.4 Hz, 1.0 Hz, 1H), 7.24−7.11 (m, 3H), 7.05 (dd, J = 7.3 Hz, 0.8 Hz, 1H), 6.59 (t, J = 4.8

Hz, 1H), 4.45 (t, *J* = 8.1 Hz, 2H), 3.11 (t, *J* = 8.1 Hz, 2H), 2.28 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 167.8, 159.1, 157.7, 137.3, 137.0, 136.0, 134.2, 131.3, 129.0, 127.3, 127.0, 125.5, 124.6, 123.1, 121.1, 111.4, 51.9, 28.7, 20.1; **HRMS (ESI)**: calcd for $C_{20}H_{19}N_4O^+$ $[M+H]^+$ 331.1553 found 331.1548.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)thiophene-2-carboxamide (3aw): 3aw** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2w** (38 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3aw** (56 mg, 69%) as a white solid. **R_f**: 0.41 (silica gel, 30% EtOAc/Hexane); **M. P.:** 144−149 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3061, 2921, 1652, 1584, 1553, 1455, 1424, 1368, 1303, 1210, 1067, 994, 855, 734; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.15 (s, 1H), 8.53 (d, *J* = 4.8 Hz, 2H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.56 (dd, *J* = 3.6 Hz, 1.0 Hz, 1H), 7.45 (dd, *J* = 4.9 Hz, 1.0 Hz, 1H), 7.14 (t, *J* = 7.7 Hz, 1H), 7.10−7.04 (m, 2H), 6.76 (t, *J* = 4.8 Hz, 1H), 4.48 (t, *J* = 7.9 Hz, 2H), 3.10 (t, *J* = 7.7 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 160.0, 159.6, 158.1, 140.3, 136.1, 134.9, 129.8, 128.8, 127.6, 126.9, 124.7, 124.2, 121.4, 111.6, 51.9, 28.9; **HRMS (ESI)**: calcd for $C_{17}H_{15}N_4OS^+$ $[M+H]^+$ 323.0961found 323.0957.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)acetamide (3ax): 3ax** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2x** (18 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 15% EtOAc/Hexane to afford **3ax** (20 mg, 31%) as a white solid. **R_f**: 0.60 (silica gel, 30% EtOAc/Hexane); **M. P.:** 125−129 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3006, 2360, 1733, 1672, 1600, 1584, 1507, 1457, 1379, 1282, 1188, 1064, 995; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.65 (s, 1H), 8.47 (d, *J* = 4.8 Hz, 2H), 7.78 (d, *J* = 8.0 Hz, 1H), 7.10 (t, *J* = 8.0 Hz, 1H), 7.02 (d, *J* = 7.3 Hz, 1H), 6.74 (t, *J* = 4.8 Hz, 1H), 4.44 (t, *J* = 7.8 Hz, 2H), 3.08 (t, *J* = 8.0 Hz, 2H), 2.06 9s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 168.1, 159.4, 157.8, 135.9, 134.2, 127.1,

124.7, 123.6, 121.1, 111.6, 52.0, 28.8, 24.7; **HRMS (ESI)**: calcd for $C_{14}H_{15}N_4O^+$ $[M+H]^+$ 255.1240 found 255.1235.

2,2,2-trifluoro-*N*-(1-(pyrimidin-2-yl)indolin-7-yl)acetamide (3ay): 3ay was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2y** (34 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 10% EtOAc/Hexane to afford **3ay** (31 mg, 40%) as a white solid. $\mathbf{R}_f$: 0.66 (silica gel, 30% EtOAc/Hexane); **M. P.:** 72−77 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2920, 2852, 1580, 1551, 1420, 1376, 1282, 1144, 1116, 1081, 1015, 997; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 13.15 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.92−7.86 (m, 1H), 7.17−7.08 (m, 2H), 6.77 (t, J = 4.8 Hz, 1H), 4.47 (t, J = 8.4 Hz, 2H), 3.13 (t, J = 8.1 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.6, 157.8, 154.9 (q, $J_{C\text{-}F}$ = 36 Hz), 136.2, 134.4, 124.6, 124.2, 122.9, 122.6, 116.5 (q, $J_{C\text{-}F}$ = 288 Hz), 111.8, 51.5, 28.4; **HRMS (ESI)**: calcd for $C_{14}H_{12}F_3N_4O^+$ $[M+H]^+$ 309.0958 found 309.0958.

***N*-(1-(pyrimidin-2-yl)indolin-7-yl)pivalamide (3az): 3az** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), carboxamide **2z** (31 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **3az** (16 mg, 22%) as a white solid. $\mathbf{R}_f$: 0.41 (silica gel, 30% EtOAc/Hexane); **M. P.:** 72−77 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3006, 2360, 1668, 1584, 1507, 1457, 1378, 1286, 1172, 1068, 995. **^{1}H NMR (400 MHz, $CDCl_3$):** δ 9.94 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.68 (dd, J = 8.0 Hz, 0.5 Hz, 1H), 7.10 (t, J = 8.2 Hz, 1H), 7.02 (dd J = 7.2 Hz, 1.0 Hz, 1H), 6.73 (t, J = 4.8 Hz, 1H), 4.46 (t, J = 8.0 Hz, 2H), 3.06 (t, J = 7.7 Hz, 2H), 1.18 (s, 9H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 176.9, 160.0, 158.1, 135.9, 135.1, 127.6, 124.7, 124.6, 121.1, 111.6, 52.1, 39.6, 29.1, 27.8; **HRMS (ESI)**: calcd for $C_{17}H_{21}N_4O^+$ $[M+H]^+$ 297.1710 found 297.1710.

4-methyl-*N*-(2-methyl-1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ba): 3ba was prepared according to general procedure (**A**) using indoline pyrimidine **1b** (53 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ba** (65 mg, 68%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 142−147 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2980, 2933, 2358, 1542, 1473, 1339, 1251, 1157, 1089, 1006; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.97 (s, 1H), 8.48 (d, J = 4.8 Hz, 2H), 7.45 (d, J = 7.6 Hz, 1H), 7.21 (d, J = 8.3 Hz, 2H), 7.10−7.01 (m, 2H), 6.99 (d, J = 8.1 Hz, 2H), 6.75 (t, J = 4.8 Hz, 1H), 4.93−4.82 (m, 1H), 3.27 (dd, J = 15.4 Hz, 8.9 Hz, 1H), 2.38 (d, J = 15.4 Hz, 1H), 2.27 (s, 3H), 0.68 (d, J = 6.4 Hz, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 143.0, 137.7, 135.3, 134.5, 129.3, 126.9, 126.6, 125.4, 124.8, 123.4, 111.7, 58.6, 35.7, 21.4, 19.4; **HRMS (ESI)**: calcd for $C_{20}H_{21}N_4O_2S^+$ $[M+H]^+$ 381.1380, found 381.1382.

4-methyl-N-(2-phenyl-1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3ca): 3ca was prepared according to general procedure (**A**) using indoline pyrimidine **1c** (68 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ca** (65 mg, 58%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 178−183 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2362, 2331, 2319, 1575, 1557, 1541, 1507, 1488, 1456, 1396, 1338, 1315, 1123, 1091; **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 11.64 (s, 1H), 8.47 (d, J = 4.9 Hz, 2H), 7.58−7.44 (m, 3H), 7.21−7.15 (m, 1H), 7.14−7.07 (m, 2H), 7.06−6.98 (m, 3H), 6.97−6.87 (m, 3H), 6.70 (t, J = 4.9 Hz, 1H), 6.09 (d, J = 9.7 Hz, 1H), 3.70 (dd, J = 15.7 Hz, 10.1 Hz, 1H), 2.86 (d, J = 15.5 Hz, 1H), 2.3 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.8, 157.9, 142.9, 142.8, 138.2, 135.3, 134.2, 129.5, 128.6, 127.2, 126.9, 125.8, 125.5, 125.3, 123.7, 122.0, 112.2, 65.0, 37.7, 21.7; **HRMS (ESI)**: calcd for $C_{25}H_{23}N_4O_2S^+$ $[M+H]^+$ 443.1536, found 443.1531.

4-methyl-*N*-(3-methyl-1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3da): 3da was prepared according to general procedure (**A**) using indoline pyrimidine **1d** (53 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3da** (58 mg, 61%) as a yellow solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 133−138 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2355, 2328, 1549, 1454, 1395, 1286, 1156, 1119, 1108, 1024, 993; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.81 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.39 (dd, J = 7.9 Hz, 0.8 Hz, 1H), 7.14−7.07 (m, 3H), 7.04−6.97 (m, 3H), 6.73 (t, J = 4.8 Hz, 1H), 4.22−4.09 (m, 1H), 3.30−3.16 (m, 2H), 2.32 (s, 3H), 1.18 (d, J = 6.6 Hz, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 142.9, 140.6, 137.2, 136.8, 128.9, 127.3, 126.8, 124.8, 121.8, 111.5, 58.7, 34.3, 21.5, 19.2; **HRMS (ESI)**: calcd for $C_{20}H_{21}N_4O_2S^+$ $[M+H]^+$ 381.1380, found 381.1377.

***N*-(4-bromo-1-(pyrimidin-2-yl)indolin-7-yl)-4-methylbenzenesulfonamide (3ea): 3ea** was prepared according to general procedure (**A**) using indoline pyrimidine **1e** (69 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ea** (55 mg, 49%) as a yellow solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 147−152 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2954, 2852, 1578, 1455, 1412, 1376, 1316, 1282, 1184, 1084, 988; **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 10.84 (s, 1H), 8.48 (d, J = 4.8 Hz, 2H), 7.27 (d, J = 8.0 Hz, 1H), 7.19 (d, J = 8.5 Hz, 1H), 7.15 (d, J = 8.2 Hz, 2H), 7.02(d, J = 8.0 Hz, 2H), 6.78 (t, J = 4.8 Hz, 1H), 3.91 (t, J = 8.4 Hz, 2H), 2.92 (t, J = 8.3 Hz, 2H), 2.34 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 143.2, 138.0, 137.1, 135.7, 129.1, 128.8, 127.5, 126.7, 124.0, 117.3, 112.1, 50.5, 29.7, 21.5; **HRMS (ESI)**: calcd for $C_{19}H_{18}BrN_4O_2S^+$ $[M+H]^+$ 445.0328, found 445.0327.

4-methyl-*N*-(5-methyl-1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3fa): 3fa was prepared according to general procedure (**A**) using indoline pyrimidine **1f** (53 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3fa** (58 mg, 61%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 130−135 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2964, 2371, 2357, 1586, 1541, 1474, 1404, 1312, 1285, 1164, 1082; **^{1}H NMR (400 MHz, $CDCl_3$)**: 10.88 (s, 1H), 8.43 (d, J = 4.8 Hz, 2H), 7.19 (s, 1H), 7.14 (d, J = 8.2 Hz, 2H), 6.99 (d, J = 8.2 Hz, 2H),

6.87 (s, 1H), 6.70 (t, *J* = 4.8 Hz, 1H), 3.84 (t, *J* = 8.2 Hz, 2H), 2.86 (t, *J* = 8.2 Hz, 2H), 2.32 (s, 6H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: *δ* 157.7, 142.8, 137.2, 135.5, 134.8, 134.7, 127.4, 128.9, 126.7, 124.5, 123.9, 111.2, 51.1, 28.2, 21.5, 20.8; **HRMS (ESI)**: calcd for $C_{20}H_{21}N_4O_2S^+$ $[M+H]^+$ 381.1380, found 381.1384.

***N*-(5-methoxy-1-(pyrimidin-2-yl)indolin-7-yl)-4-methylbenzenesulfonamide (3ga): 3ga** was prepared according to general procedure (**A**) using indoline pyrimidine **1g** (57 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ga** (65 mg, 65%) as a yellow solid. **R_f**: 0.41 (silica gel, DCM); **M. P.:** 140−145 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2953, 2852, 1587, 1549, 1527, 1514, 1375, 1282, 1144, 1105, 1015; **^{1}H NMR (400 MHz, $CDCl_3$)**: *δ* 11.13 (s, 1H), 8.43 (d, *J* = 4.5 Hz, 2H), 7.22 (d, *J* = 7.9 Hz, 2H), 7.02 (d, *J* = 7.8 Hz, 2H), 6.91 (s, 1H), 6.78 (t, *J* = 4.5 Hz, 1H), 6.63 (s, 1H), 3.89 (t, *J* = 7.9 Hz, 2H), 3.81 (s, 3H), 2.88 (t, *J* = 7.9 Hz, 2H), 2.33 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: *δ* 157.7, 157.2, 143.0, 137.3, 136.9, 130.4, 129.0, 126.8, 125.7, 111.0, 110.3, 110.1, 55.9, 51.0, 28.6, 21.5; **HRMS (ESI)**: calcd for $C_{20}H_{21}N_4O_3S^+$ $[M+H]^+$ 397.1329, found 397.1330.

***N*-(5-fluoro-1-(pyrimidin-2-yl)indolin-7-yl)-4-methylbenzenesulfonamide (3ha): 3ha** was prepared according to general procedure (**A**) using indoline pyrimidine **1h** (52 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ha** (59 mg, 61%) as a yellow solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 210−215 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2920, 2851, 1585, 1454, 1339, 1312, 1224, 1131, 1088, 1035, 1007, 978; **^{1}H NMR (400 MHz, $CDCl_3$)**: *δ* 11.25 (s, 1H), 8.46 (d, *J* = 4.8 Hz, 2H), 7.29−7.23 (m, 2H), 7.11 (dd, *J* = 9.9 Hz, 2.5 Hz, 1H), 7.05 (d, *J* = 8.2 Hz, 2H), 6.79−6.71 (m, 2H), 3.96 (t, *J* = 8.2 Hz, 2H), 2.91 (t, *J* = 8.2 Hz, 2H), 2.34 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: *δ* 159.7 (d, $J_{C\text{-}F}$ = 243 Hz), 157.8, 143.2, 137.2 (d, $J_{C\text{-}F}$ = 9.2 Hz), 137.1, 132.8, 129.2, 126.8, 126.0 (d, $J_{C\text{-}F}$ = 11.3 Hz), 112.3 (d, $J_{C\text{-}F}$ = 25.6 Hz), 111.5, 110.1 (d, $J_{C\text{-}F}$ = 11.3 Hz), 51.3, 28.5, 21.5; **HRMS (ESI)**: calcd for $C_{19}H_{18}FN_4O_2S^+$ $[M+H]^+$ 385.1129, found 385.1131.

***N*-(5-chloro-1-(pyrimidin-2-yl)indolin-7-yl)-4-methylbenzenesulfonamide (3ia): 3ia** was prepared according to general procedure (**A**) using indoline pyrimidine **1i** (58 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ia** (55 mg, 55%) as a orange solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 175−180 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2360, 2326, 1595,

1461, 1409, 1151, 1091, 1066, 956, 886; **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 11.12 (s, 1H), 8.47 (d, J = 4.9 Hz, 2H), 7.38 (d, J = 1.8 Hz, 1H), 7.21 (d, J = 8.2 Hz, 2H), 7.06−6.97 (m, 3H), 6.76 (t, J = 4.8 Hz, 1H), 3.92 (t, J = 8.3 Hz, 2H), 2.91 (t, J = 8.3 Hz, 2H), 2.33 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.7, 143.2, 137.1, 135.6, 129.4, 129.1, 126.8, 126.2, 125.8, 123.0, 111.8, 51.3, 28.1, 21.6; **HRMS (ESI)**: calcd for $C_{19}H_{18}ClN_4O_2S+$ $[M+H]^+$ 401.0834, found 401.0835.

***N-(*5-bromo-1-(pyrimidin-2-yl)indolin-7-yl)-4-methylbenzenesulfonamide (3ja): 3ja** was prepared according to general procedure (**A**) using indoline pyrimidine **1j** (70 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ja** (44 mg, 40%) as a yellow solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 163−168 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2979, 2957, 1457, 1394, 1261, 1149, 1082, 1041, 1026, 969; **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 11.09 (s, 1H), 8.47 (d, J = 4.5 Hz, 2H), 7.25 (s, 1H), 7.23−7.12 (m, 3H), 7.03 (d, J = 7.9 Hz, 2H), 6.77 (t, J = 4.5 Hz, 1H), 3.91 (t, J = 8.0 Hz, 2H), 2.91 (t, J = 8.2 Hz, 2H), 2.33 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.8, 157.6, 143.2, 137.4, 137.0, 136.2, 129.1, 126.8, 126.0, 125.9, 116.6, 111.9, 51.2, 28.0, 21.5; **HRMS (ESI)**: calcd for $C_{19}H_{18}BrN_4O_2S^+$ $[M+H]^+$ 445.0328, found 445.0328.

***N-(*6-chloro-1-(pyrimidin-2-yl)indolin-7-yl)-4-methylbenzenesulfonamide (3ka): 3ka** was prepared according to general procedure (**A**) using indoline pyrimidine **1k** (57 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ka** (32 mg, 32%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 207−212 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2920, 2852, 1575, 1558, 1507, 1489, 1457, 1418, 1396, 1339, 771; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.08 (s, 1H), 8.43 (d, J = 4.8 Hz, 2H), 7.24 (d, J = 8.0 Hz, 1H), 7.16 (d, J = 8.3 Hz, 2H), 7.03 (d, J = 8.0 Hz, 1H) 7.00 (d, J = 8.0 Hz, 2H), 6.75 (t, J = 4.8 Hz, 1H), 3.88 (t, J = 7.5 Hz, 2H), 2.90 (t, J = 8.0 Hz, 2H), 2.32 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.6, 143.2, 140.9, 137.8, 134.5, 134.4, 129.0, 126.7, 126.6, 126.3, 124.0, 122.3, 111.9, 51.6, 27.8, 21.6; **HRMS (ESI)**: calcd for $C_{19}H_{18}ClN_4O_2S^+$ $[M+H]^+$ 401.0834 found 401.0835.

4-methyl-*N*-(6-nitro-1-(pyrimidin-2-yl)indolin-7-yl)benzenesulfonamide (3la): 3la was prepared according to general procedure (**A**) using indoline pyrimidine **1l** (60 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3la** (23 mg, 21%) as a yellow solid.

R_f: 0.50 (silica gel, DCM); **M. P.:** 232−237 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2955, 2853, 1712, 1463, 1377, 1252, 1085, 908, 721; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.43 (s, 1H), 8.52 (d, J = 4.9 Hz, 2H), 7.59 (d, J = 7.9 Hz, 1H), 7.17 (d, J = 7.9 Hz, 1H), 7.05 (d, J = 8.3 Hz, 2H), 6.99 (d, J = 8.1 Hz, 2H), 6.85 (t, J = 4.9 Hz, 1H), 3.88 (t, J = 8.0 Hz, 2H), 2.98 (t, J = 8.0 Hz, 2H), 2.34 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.9, 157.3, 149.5, 143.5, 140.8, 140.3, 136.9, 129.1, 126.6, 123.1, 121.2, 117.1, 112.7, 51.8, 28.0, 21.6; **HRMS (ESI)**: calcd for $C_{19}H_{17}N_5O_4S^+$ $[M+Na]^+$ 434.0893, found 434.0893.

4-methyl-*N*-(9-(pyrimidin-2-yl)-9H-carbazol-1-yl)benzenesulfonamide (3ma): 3ma was prepared according to general procedure (**A**) using indoline pyrimidine **1m** (61 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3ma** (43 mg, 42%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 137−142 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2953, 2851, 2361, 2322, 1557, 1541, 1507, 1488, 1416, 1337, 1317, 1256, 1155, 1084, 998; **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 10.14 (s, 1H), 8.85 (d, J = 4.7 Hz, 2H), 8.44 (d, J = 8.5 Hz, 1H), 7.97 (d, J = 7.3 Hz, 1H), 7.92 (dd, J = 7.7 Hz, 1.0 Hz, 1H), 7.67 (d, J = 7.7 Hz, 1H), 7.40 (t, J = 7.6 Hz, 2H), 7.33 (t, J = 6.7 Hz, 1H), 7.22 (t, J = 4.8 Hz, 1H), 7.0 (d, J = 8.2 Hz, 2H), 6.81 (d, J = 8.2 Hz, 2H), 2.15 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 158.2, 157.6, 143.3, 140.2, 136.7, 132.4, 129.3, 128.4, 127.0, 126.3, 125.6, 124.3, 123.7, 123.1, 119.5, 118.1, 116.7, 115.9, 21.4; **HRMS (ESI)**: calcd for $C_{23}H_{19}N_4O_2S^+$ $[M+H]^+$ 415.1223 found 415.1222

4-methyl-*N*-(9-(pyrimidin-2-yl)-2,3,4,4a,9,9a-hexahydro-1H-carbazol-8-yl)benzenesulfonamide (3na): 3na was prepared according to general procedure (**A**) using indoline pyrimidine **1n** (62 mg, 0.25 mmol), sulfonamide **2a** (51 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 2% EtOAc/DCM to afford **3na** (70 mg, 66%) as a white solid. **R_f**: 0.50 (silica gel, DCM); **M. P.:** 197−202 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2359, 2332, 1575, 1558, 1541, 1507, 1472, 1436, 1418, 1386, 1316, 1160, 1005; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 10.87 (s, 1H), 8.46 (d, J = 4.8 Hz, 2H), 7.45 (d, J = 8.0 Hz, 1H), 7.22 (d, J = 8.2 Hz, 2H), 7.11 (t, J = 7.8 Hz, 1H), 7.04−6.94 (m, 3H), 6.72 (t, J = 4.8 Hz, 1H), 4.84−4.71 (m, 1H), 3.36 (t, J = 5.9 Hz, 1H), 2.27 (s, 3H);), 2.21 (d, J = 14.3 Hz, 1H), 1.77−1.64 (m, 1H), 1.52−1.33 (m, 3H), 1.21−0.90 (m, 2H), 0.18−0.03 (m, 1H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 157.9, 143.0, 138.1, 137.7, 136.0, 129.3, 126.8, 126.2, 126.0, 124.9, 120.6, 111.4, 63.8, 39.6, 26.2, 24.3, 22.9, 21.4, 20.8; **HRMS (ESI)**: calcd for $C_{23}H_{25}N_4O_2S^+$ $[M+H]^+$ 421.1693, found 421.1694.

1-(pyrimidin-2-yl)-*N*-(p-tolyl)indolin-7-amine (5aa): 5aa was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4a** (42 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **5aa** (44 mg, 52%) as a yellow solid. $\mathbf{R_f}$: 0.41 (silica gel, 30% EtOAc/Hexane); **M. P.:** 155−160 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2980, 2360, 2331, 1541, 1520, 1507, 1395, 1387, 1374, 773; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 9.28 (s, 1H), 8.51 (d, J = 4.8 Hz, 2H), 8.03 (d, J = 9.2 Hz, 2H), 7.28 (d, J = 7.6 Hz, 1H), 7.11 (t, J = 7.4 Hz, 1H), 7.06−7.02 (m, 1H), 6.83−6.73 (m, 3H), 4.47 (t, J = 8.3 Hz, 2H), 3.15 (t, J = 8.2 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 159.6, 157.8, 150.6, 139.1, 137.1, 135.8, 129.4, 126.4, 124.9, 121.8, 120.8, 113.1, 111.8, 52.2, 29.0; **HRMS (ESI)**: calcd for $C_{18}H_{16}N_5O_2^+$ $[M+H]^+$ 334.1299 found 334.1295.

***N*-(3-nitrophenyl)-1-(pyrimidin-2-yl)indolin-7-amine (5ab): 5ab** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4b** (44 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **5ab** (45 mg, 54%) as a yellow solid. $\mathbf{R_f}$: 0.41 (silica gel, 30% EtOAc/Hexane); **M. P.:** 157−162 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2955, 2923, 2361, 1717, 1595, 1541, 1507, 1487, 1418, 1320, 1286, 1153, 1120, 1071; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 8.46 (s, 1H), 8.51 (d, J = 4.8 Hz, 2H), 7.66 (t J = 2.24 Hz, 1H), 7.56 (ddd, J = 8.0 Hz, 2.3 Hz, 0.9 Hz, 1H), 7.30−7.22 (m, 2H), 7.13 (ddd, J = 8.1 Hz, 2.3 Hz, 0.8 Hz, 1H), 7.09 (t, J = 7.8 Hz, 1H), 6.99 (dd, J = 7.9 Hz, 1.0 Hz, 1H), 6.74 (t, J = 4.8 Hz, 1H), 4.47 (t, J = 8.0 Hz, 2H), 3.12 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 159.9, 157.9, 149.5, 146.0, 137.0, 135.2, 131.1, 129.8, 125.1, 121.1, 120.3, 119.6, 113.5, 116.6, 109.5, 52.3, 29.2; **HRMS (ESI)**: calcd for $C_{18}H_{16}N_5O_2^+$ $[M+H]^+$ 334.1299 found 334.1297.

4-((1-(pyrimidin-2-yl)indolin-7-yl)amino)benzonitrile (5ac): 5ac was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4c** (36 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **5ac** (48 mg, 61%) as a yellow solid. $\mathbf{R_f}$: 0.50 (silica gel, 30% EtOAc/Hexane); **M. P.:** 146−151 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2972, 2359, 2216, 1595, 1583, 1519, 1380, 1242, 1126, 1070; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 8.87 (s, 1H), 8.49 (d, J = 4.8 Hz, 2H), 7.38 (d J = 8.9 Hz, 2H), 7.26 (d, J = 7.3 Hz, 1H), 7.08 (t, J = 8.0 Hz, 1H), 7.00 (dd, J = 7.3 Hz, 1.1 Hz, 1H), 6.82 (d, J = 8.9 Hz, 2H), 6.74 (t, J = 4.8 Hz, 1H), 4.46 (t, J = 7.9 Hz, 2H), 3.11 (t, J = 7.9 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 159.7, 157.8, 148.5,

137.0, 135.6, 133.8, 130.0, 124.9, 121.4, 120.4, 120.1, 114.4, 111.7, 100.2, 52.2, 29.1; **HRMS (ESI)**: calcd for $C_{19}H_{16}N_5^+$ $[M+H]^+$ 314.1400 found 314.1396.

***N*-(4-fluoro-3-nitrophenyl)-1-(pyrimidin-2-yl)indolin-7-amine (5ad): 5ad** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4d** (47 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **5ad** (50 mg, 56%) as a yellow oil. $\mathbf{R}_f$: 0.45 (silica gel, 30% EtOAc/Hexane); **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3032, 2926, 1698, 1584, 1504, 1464, 1432, 1357, 1351, 1284, 1223, 1061; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 8.53 (s, 1H), 8.49 (d, J = 4.8 Hz, 2H), 7.50−7.43 (m, 1H), 7.18 (d, J = 7.5 Hz, 1H), 7.11−7.01 (m, 3H), 6.97 (dd, J = 7.9 Hz, 1.2 Hz, 1H), 6.73 (t, J = 4.8 Hz, 1H), 4.47 (t, J = 8.1 Hz, 2H), 3.11 (t, J = 8.0 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 159.9, 157.9, 148.9 (d, J_{CF} = 257.0 Hz), 141.6, 137.8 (d, J_{CF} = 8.8 Hz), 137.0, 135.0, 131.4, 125.2, 122.2 (d, J_{CF} = 6.9 Hz), 119.7, 119.5, 118.9, 118.8, 111.6, 111.3, 52.2, 29.1; **HRMS (ESI)**: calcd for $C_{18}H_{15}FN_5O_2^+$ $[M+H]^+$ 352.1204 found 352.1197.

***N*-(3,4-dinitrophenyl)-1-(pyrimidin-2-yl)indolin-7-amine (5ae): 5ae** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4e** (56 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 28% EtOAc/Hexane to afford **5ae** (19 mg, 20%) as a red solid. $\mathbf{R}_f$: 0.38 (silica gel, 30% EtOAc/Hexane); **M. P.:** 178−183 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2926, 2361, 1698, 1653, 1598, 1557, 1520, 1507, 1463, 1417, 1360, 1285, 1063; **^{1}H NMR (400 MHz, $CDCl_3$):** δ 11.24 (s, 1H), 9.08 (d, J = 2.6 Hz, 1H), 8.60 (d, J = 4.8 Hz, 2H), 8.05 (dd, J = 9.5 Hz, 2.6 Hz, 1H), 7.22 (dd, J = 6.9 Hz, 1.3 Hz, 1H), 7.20−7.11 (m, 2H), 7.05 (d, J = 9.6 Hz, 1H), 6.81 (t, J = 4.8 Hz, 1H), 4.50 (t, J = 8.2 Hz, 2H), 3.18 (t, J = 8.2 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 160.0, 158.5, 146.6, 138.6, 137.7, 137.0, 132.2, 129.3, 127.2, 124.9, 124.8, 124.3, 123.4, 117.1, 112.8, 52.1, 29.2; ; **HRMS (ESI)**: calcd for $C_{18}H_{15}N_6O_4^+$ $[M+H]^+$ 379.1149 found 379.1142.

***N*-(3,5-bis(trifluoromethyl)phenyl)-1-(pyrimidin-2-yl)indolin-7-amine (5af): 5af** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4f** (70 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 10 % EtOAc/Hexane to afford **5af** (26 mg, 24%) as a white solid. $\mathbf{R}_f$: 0.66 (silica gel, 30% EtOAc/Hexane); **M. P.:** 171−176 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2980, 2365, 2342, 1556, 1541, 1506, 1456, 1417, 1395, 1279, 1109, 998; **^{1}H NMR (400 MHz,**

$CDCl_3$): δ 8.79 (s, 1H), 8.51 (d, J = 4.8 Hz, 2H), 7.23 (d, J = 7.9 Hz, 1H), 7.20−7.16 (m, 3H), 7.10 (t, J = 8.0 Hz, 1H), 7.01 (dd, J = 7.2 Hz, 1.0 Hz, 1H), 6.75 (t, J = 4.8 Hz, 1H), 4.48 (t, J = 8.0 Hz, 2H), 3.12 (t, J = 7.8 Hz, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 159.8, 157.9, 146.0, 137.2, 135.4, 132.5 (q, J_{CF} = 33.0 Hz), 130.5, 125.2, 123.6 (q, J_{CF} = 272.0 Hz), 120.4, 120.0, 114.4 (q, J_{CF} = 3.4 Hz), 111.8, 111.7 (q, J_{CF} = 3.8 Hz), 52.2, 29.1; **HRMS (ESI)**: calcd for $C_{20}H_{15}F_6N_4^+$ $[M+H]^+$ 425.1195 found 425.1194.

***N*-phenyl-1-(pyrimidin-2-yl)indolin-7-amine (5ag): 5ag** was prepared according to general procedure (**A**) using indoline pyrimidine **1a** (50 mg, 0.25 mmol), aniline **4g** (28 mg, 0.30 mmol). The crude reaction mixture was purified by column chromatography using 25% EtOAc/Hexane to afford **5ag** (18 mg, 25%) as a yellow solid. **R_f**: 0.50 (silica gel, 30% EtOAc/Hexane); **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 2955, 2924, 2360, 1716, 162, 1647, 1616, 1552, 1507, 1417, 1362, 1188, 908; **^{1}H NMR (400 MHz, $CDCl_3$)**: 8.47 (d, J = 4.8Hz, 2H), 8.10 **(**s, 1H), 7.27 (d, J = 7.87Hz, 1H), 7.23-7.15 (m, 2H), 7.01 (t, J = 7.23Hz, 1H), 6.97-7.15 (m, 2H), 6.87 (dd, J = 7.27, 1.19Hz, 1H), 6.84-6.78 (m, 1H), 6.68 (t, J = 4.8Hz, 1H), 4.45(t, J = 7.94Hz, 2H), 3.09 (t, J = 7.95, 2H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 160.0, 157.8, 144.2, 136.5, 134.0, 133.4, 129.3, 124.9, 119.9, 118.7, 117.7, 117.0, 111.2, 52.4, 29.4; **HRMS (ESI)**: calcd for $C18H17N4^+$ $[M+H]^+$ 289.1448, found 289.1449.

4-methoxy-*N*-(1-(pyrimidin-2-yl)-1H-indol-7-yl)benzenesulfonamide (6): To a sealed tube vial containing **3ad** (50 mg, 0.15 mmol, 1.00 quiv) and DDQ (71 mg, 0.31 mmol, 2.00 equiv), 1,4-dioxane (2.0 mL) was added. The mixture was stirred at 90 °C for 12 h. After completion of the reaction, the solvent was removed under reduced pressure and the residue was purified by column chromatography with 30% EtOAc/Hexane to give indole pyrimidine **6** (49 mg, 86%) as a brown solid. **R_f**: 0.40 (silica gel, 40% EtOAc/Hexane); **M. P.:** 87–92 ˚C; **IR (in $CHCl_3$, cm^{-1}):** ν_{max}; 3026, 1583, 1496, 1427, 1355, 1294, 1204, 1157, 1093, 1029, 895. **^{1}H NMR (400 MHz, $CDCl_3$)**: 12.12 (s, 1H), 8.72 (d, J = 4.8 Hz, 2H), 8.10 (d, J = 3.8 Hz, 1H), 7.48 (d, J = 7.7 Hz, 1H), 7.36 (dd, J = 7.5 Hz, 0.8 Hz, 1H), 7.25 – 7.18 (m, 3H), 7.14 (t, J = 4.7 Hz, 1H), 6.62 – 6.53 (m, 3H), 3.72 (s, 3H); **^{13}C {^{1}H} NMR (100 MHz, $CDCl_3$)**: δ 162.7, 158.3, 156.3, 134.2, 131.4, 128.7, 128.5, 127.9, 124.9, 123.8, 120.4, 118.6, 116.5, 113.7, 108.2, 55.6; **HRMS (ESI)**: calcd for $C_{19}H_{17}N_4O_3S^+$ $[M+H]^+$ 381.1016, found 381.1018.

***N*-(1H-indol-7-yl)-4-methoxybenzenesulfonamide (ER-67836, (II)):** To a dried sealed tube vial **6** (30 mg, 0.078 mmol), freshly prepared 20% NaOEt in ethanol (135 µL) in dimethyl

sulfoxide (2 ml) under argon atmosphere was taken; reaction mixture was kept at 100 ºC for 5 h. After cooling to ambient temperature, the reaction mixture was neutralized with 1N HCl at 0 ºC, the reaction mixture was diluted with Ethyl Acetate (15 mL). The filtrate was concentrated and the crude residue was purified by column chromatography on silica gel with 30% Ethyl Acetate Hexane to give 7-sulfonamidated indole **ER-67836 (II)** (15 mg, 63%) as white solid. **R*f***: 0.60 (silica gel, 40% EtOAc/Hexane); **M. P.:** 83–88 °C; **IR (in CHCl3, cm-1):** ν_{max}; 3420, 3009, 2927, 1596, 1461, 1415, 1336, 1155, 1029, 895. **1H NMR in CDCl3 (400 MHz):** 9.28 (s, 1H), 7.56 (d, *J* = 8.8 Hz, 2H), 7.48 (d, *J* = 8.0 Hz, 1H), 7.27 (t, *J* = 2.8 Hz, 1H), 6.88 – 6.81 (m, 3H), 6.61 (s, 1H), 6.54 (dd, *J* = 3.1 Hz, 2.0 Hz, 1H), 6.39 (d, *J* = 7.3 Hz, 1H), 3.30 (s, 3H); **^{13}C {^{1}H} NMR in CDCl$_3$ (100 MHz):** 163.4, 132.1, 130.3, 129.7, 129.5, 125.4, 120.2, 120.0, 119.8, 118.2, 114.2, 102.8, 55.7; **HRMS (ESI)**: calcd for $C_{15}H_{15}N_2O_3S^+$ $[M+H]^+$ 303.0798, found 303.0801.

ASSOCIATED CONTENT

Supporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI:

Full experimental details, characterization data for new compounds, copies of NMR (PDF), X-ray data for **3ah** (CIF)

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Notes

The authors declare no competing financial interest.

Author Contributions

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