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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KYU YOUNG HWANG,
O HYUN KWON, YOUNG KWON KIM,
HYEON HO CHOI, and BYOUNG KI CHOI

Appeal 2019-002634
Application 14/152,153
Technology Center 1700

Before JEFFREY T. SMITH, GEORGE C. BEST, and
N. WHITNEY WILSON, *Administrative Patent Judges*.

WILSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's February 1, 2018 decision finally rejecting claims 1, 2, 7, 14, and 16–20² (“Final Act.”). We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

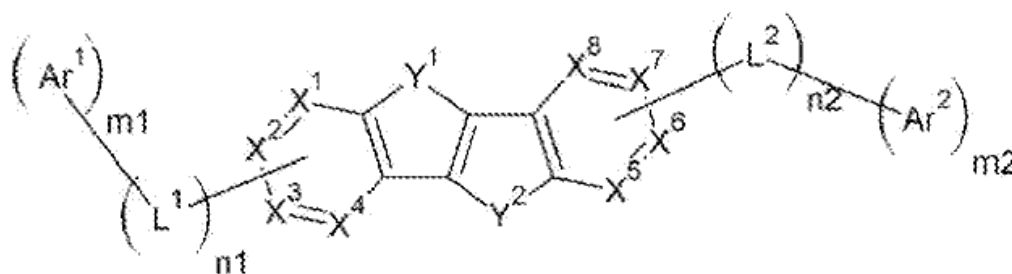
We affirm.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Samsung Electronics Co. Ltd. and Cheil Industries, Inc., as the real parties in interest (Appeal Br. 2).

² Claims 4–6, 8, 10–12, and 15 have been withdrawn from consideration (Final Act. 2).

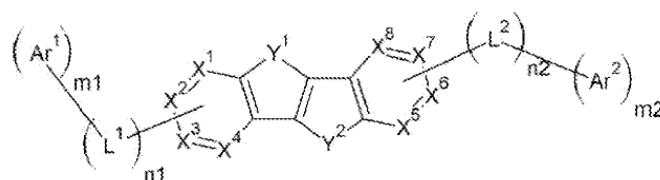
CLAIMED SUBJECT MATTER

Appellant's disclosure relates to a compound for an organic optoelectronic device represented by the following chemical formula:



wherein groups X^1 to X^8 , Y^1 , Y^2 , L^1 , L^2 , Ar^1 , Ar^2 , and variables m_1 , m_2 , n_1 , and n_2 are defined in the Specification and claims. Details of the claimed compounds are set forth in representative claim 1, which is reproduced below from the Claims Appendix to the Appeal Brief (*emphasis added*):

1. A compound for an organic optoelectronic device represented by Chemical Formula 1:



wherein, in Chemical Formula 1,

Y^1 is NR' , wherein R' is a substituted or unsubstituted C6 to C30 aryl group,

Y^2 is $-O-$, $-S-$, or $-S(O_2)-$,

X^1 to X^8 are independently $-CR'-$ or $-N-$,

any two adjacent X^1 to X^8 optionally form a fused ring,

Ar^1 , Ar^2 , and R' are independently hydrogen, deuterium, a halogen, a cyano group, a hydroxyl group, an amino group, a substituted or unsubstituted C1 to C20 amine group, a nitro group, a carboxyl group, a ferrocenyl group, a substituted or unsubstituted C1 to C20 alkyl group, a substituted or

unsubstituted C6 to C30 aryl group, a substituted or unsubstituted C2 to C30 heteroaryl group, a substituted or unsubstituted C1 to C20 alkoxy group, a substituted or unsubstituted C6 to C20 aryloxy group, a substituted or unsubstituted C3 to C40 silyloxy group, a substituted or unsubstituted C1 to C20 acyl group, a substituted or unsubstituted C2 to C20 alkoxy carbonyl group, a substituted or unsubstituted C2 to C20 acyloxy group, a substituted or unsubstituted C2 to C20 acylamino group, a substituted or unsubstituted C2 to C20 alkoxy carbonylamino group, a substituted or unsubstituted C7 to C20 aryloxy carbonylamino group, a substituted or unsubstituted C1 to C20 sulfamoylamino group, a substituted or unsubstituted C1 to C20 sulfonyl group, a substituted or unsubstituted C1 to C20 alkylthio group, a substituted or unsubstituted C6 to C20 arylthio group, a substituted or unsubstituted C1 to C20 heterocyclothio group, a substituted or unsubstituted C1 to C20 ureide group, a substituted or unsubstituted C3 to C40 silyl group, or a combination thereof,

one of X^1 to X^4 is $-CR'$ -, wherein R' forms a bond with an adjacent substituent,

one of X^5 to X^8 is $-CR'$ -, wherein the R' forms a bond with an adjacent substituent,

at least one of Ar^1 and Ar^2 is a substituted or unsubstituted quinolinyl group, a substituted or unsubstituted isoquinolinyl group, a substituted or unsubstituted pyridyl group, a substituted or unsubstituted pyrimidinyl group, a substituted or unsubstituted triazinyl group, or a combination thereof,

L^1 and L^2 are independently a substituted or unsubstituted C2 to C20 alkenylene group, a substituted or unsubstituted C2 to C20 alkynylene group, a substituted or unsubstituted C6 to C30 arylene group, a substituted or unsubstituted C2 to C30 heteroarylene group, or a combination thereof,

n_1 and n_2 are independently integers ranging from 0 to 3,

m_1 and m_2 are independently integers ranging from 0 to 3, and

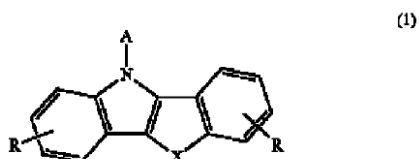
m_1 and m_2 are not simultaneously 0.

REJECTION

Claims 1, 2, 7, 14, and 16–20 are rejected under 35 U.S.C. § 103(a) as unpatentable over Sawada³ as evidenced by Hotta.⁴

DISCUSSION

The Examiner's findings are set forth at page 2–5 of the Final Action. Sawada discloses a compound having the following general formula:



The Examiner finds that X can be either O or S, and that A can be several different groups, while R can be different heterocyclic groups (Final Act. 3, citing Sawada ¶¶ 18, 23–35). To match Sawada's compound with the claimed compound, the Examiner made the following findings:

- The “X” can be O or S and corresponds to claimed Y² (Final Act. 3)
- The “N-A” corresponds to Y¹, when Y¹ is -NR'- (*id.*).
- The fused 6-member carbon rings correspond to each of X¹ to X⁸, where each of X¹ to X⁸ are -CR'- (R' can be hydrogen) (*id.*).
- R corresponds to Ar¹ and Ar² when m₁ and m₂ are equal to 1. With a single R group, one of the carbons on each fused carbon rings correspond to X¹ to X⁸ is -CR'- with an adjacent substituent (*id.*).

³ Sawada et al., WO 2012/035934, published March 22, 2012. Because Sawada is in Japanese, the Examiner, Appellant, and the Board refer to the US counterpart: US 2013/0200350 A1, published August 8, 2013.

⁴ Hotta et al., US 2013/0150576 A1, published June 13, 2013.

- There is no corresponding linking group L^1 or L^2 , but the linking groups are not required when n_1 and n_2 are 0 (*id.*).

Claim 1 recites that one of Ar^1 or Ar^2 is “a substituted or unsubstituted quinolinyl group, a substituted or unsubstituted isoquinolinyl group, a substituted or unsubstituted pyridyl group, a substituted or unsubstituted pyrimidinyl group, a substituted or unsubstituted triazinyl group, or a combination thereof.” As noted above, in the rejection, the Examiner finds that Sawada’s R group corresponds to Ar^1 and Ar^2 . To show that Sawada discloses or suggests that its R groups is one of the claimed moieties set forth above, the Examiner further finds that Sawada teaches that:

R can be an “aromatic heterocyclic group of 3 to 18 carbon atoms exclusive of a fused heterocycle consisting of 4 rings or more” [0018] and [0035]. Similarly, the reference teaches that A can be an “aromatic heterocyclic group of 3 to 30 carbon atoms exclusive of a fused heterocycle consisting of 4 rings or more” [0024]. The reference then teaches specific examples of “aromatic heterocyclic group exclusive of a fused heterocycle consisting of 4 rings or more” [0027] which may refer to either the 3 to 18 carbons or 3 to 30 carbons. The examiner interpreted the reference to be referring to both the heterocyclic groups of R and A because there is no other contrasting disclosure describing other possible heterocyclic groups exclusive of fused heterocycles consisting of 4 rings or more. Therefore, R can be the specific examples of “aromatic heterocyclic group exclusive of a fused heterocycle consisting of 4 rings or more” which includes pyridine, pyrimidine, triazine, isoquinoline, quinoline and aromatic compounds in which a plurality of these aromatic rings are linked together [0027].

(Final Act. 3–4).

Appellant argues that Sawada does not disclose or suggest that its R group is one of the claimed Ar^1 or Ar^2 moieties recited in claim 1 (Appeal Br. 9–10). In particular, Appellant points to the fact that the listing of the

specifically claimed moieties (the quinolinyl, isoquinolinyl, pyridyl, pyrimidinyl, and triazinyl groups) is done in connection with Sawada's A group, not its R group (*id.*; *see also* Reply Br. 4).

Appellant's argument is not persuasive. As explained by Appellant, the only section of Sawada which specifically mentions the claimed moieties is in paragraph 27. Paragraph 27 is a specific description of examples of the aromatic hydrocarbon group and the aromatic heterocyclic group exclusive of a fused heterocycle consisting of 4 rings or more (Sawada, ¶ 27). Sawada discloses suitable moieties for the R group includes "aromatic hydrocarbon group of 6 to 18 carbon atoms, or an aromatic heterocyclic group of 3 to 18 carbon atoms exclusive of a fused heterocycle consisting of 4 rings or more" (Sawada, ¶ 35).

The Examiner finds that in the absence of a specific disclosure as to which aromatic heterocyclic group of 3 to 18 carbon atoms exclusive of a fused heterocycle consisting of 4 rings or more preferably are preferred for Sawada's R group, a person of skill in the art would look to paragraph 27, which describes preferred structures for the A group. The moieties set forth in appealed claim 1 fall within the disclosure of Sawada. Since the description of suitable moieties for the R group encompasses the description appearing in paragraph 27, a person of ordinary skill in the art would have reasonably expected that the disclosure of suitable moieties appearing in paragraph 27 would have also been suitable for the R group. Moreover, Appellant has not pointed to any special properties, results or advantages from the recited moieties which, as noted above, are included in Sawada's general description of its R groups. Thus, we determine that the preponderance of the evidence of record supports the Examiner's

determination that it would have been obvious to arrive at the claimed compound, in particular the specifically claimed structure of the Ar¹ and Ar² groups, from the disclosure of Sawada.

Appellant has also argued that the cited art “fails to teach how to prepare the selected compounds” (Appeal Br. 10). This argument is not persuasive, essentially for the reasons set forth by the Examiner (Ans. 6).

Accordingly, we affirm the obviousness rejection over Sawada as evidenced by Hotta.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	References(s)/Basis	Affirmed	Reversed
1, 2, 7, 14, 16–20	103(a)	Sawada, Hotta	1, 2, 7, 14, 16–20	

AFFIRMED