



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/504,114	08/15/2006	Steven Tierney	MERCK-3213	1955
23599	7590	01/24/2013	EXAMINER	
MILLEN, WHITE, ZEJANO & BRANIGAN, P.C. 2200 CLARENDON BLVD. SUITE 1400 ARLINGTON, VA 22201			NGUYEN, HAIDUNG D	
			ART UNIT	PAPER NUMBER
			1761	
			NOTIFICATION DATE	DELIVERY MODE
			01/24/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mwzb.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte STEVEN TIERNEY, MARTIN HEENEY, WEIMIN ZHANG,
SIMON HIGGINS, and IAIN LIVERSEDGE

Appeal 2011-012142
Application 11/504,114
Technology Center 1700

Before ROMULO H. DELMENDO, DEBORAH KATZ, and
DONNA M. PRAISS, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*

DECISION ON APPEAL

The named inventors (hereinafter the “Appellants”)¹ seek our review under 35 U.S.C. § 134(a) of a final rejection of claims 1-10, 15-29, 36-40, 47, 49, and 51-65.² We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

¹ The Appellants identify the real party in interest as “Merck Patent GmbH.” Appeal Brief filed February 3, 2011 (“App. Br.”) at 1.

² The Examiner indicated in the final Office Action entered August 6, 2010 that claim 48 is also rejected. Claim 48, however, appears to have been

STATEMENT OF THE CASE

The invention is said to relate “to a process for coupling thiophene or selenophene derivatives, in particular for preparing conjugated thiophene or selenophene polymers with high molecular weight and high regioregularity.” Specification (“Spec.”) 1, ll. 6-9. According to the Appellants, the polymers are useful as semiconductors or charge transport materials in optical, electrooptical, or electronic devices including field effect transistors (FETs), thin film transistors (TFT), electroluminescent, photovoltaic, and sensor devices. *Id.* at 1, ll. 10-16.

Representative claim 1, the sole independent claim on appeal, is reproduced below (with key limitations shown in italics):

1. A process for (a) polymerizing a heteroaromatic compound under formation of aryl-aryl C-C couplings, wherein said heteroaromatic compound has at least one functional halide or sulfonyloxy group and at least one functional boron group, or (b) copolymerizing at least one first and at least one second heteroaromatic compound under formation of aryl-aryl C-C couplings, wherein said first compound has at least two functional halide or sulfonyloxy groups and said second compound has at least two functional boron groups, said process comprising:

performing the polymerization or copolymerization in the presence of

a) a catalyst/ligand system obtained from a palladium catalyst and an organic phosphonium compound,

canceled by amendment. *See* Amendment filed May 19, 2010.

- b) a base,
 - c) an organic solvent or a mixture of organic solvents,
- wherein

a reaction mixture is formed by combining said heteroaromatic compound or at least one first and at least one second heteroaromatic compound, said palladium catalyst, said organic phosphonium compound, said base, and said solvent or mixture of solvents, in which *said palladium catalyst and organic phosphonium compound are added as separate entities, and said catalyst/ligand system is formed in situ,*

said functional halide or sulfonyloxy groups and said boron groups are attached to a thiophene or selenophene ring that is optionally substituted and optionally fused to another ring, and

the organic phosphonium compound is a trisubstituted phosphonium salt with substituents selected from alkyl groups that are optionally substituted.

App. Br. 11 (Claims App'x).

The Examiner rejected claims 1-10, 15-29, 36-40, 47, 49, and 51-65 under 35 U.S.C. § 103(a) as unpatentable over Heeney³ in view of Jayakannan⁴ and Netherton.⁵ Examiner's Answer entered April 28, 2011

³ U.S. Patent Application Publication 2005/0090640 A1 published April 28, 2005.

⁴ M. Jayakannan, Joost L.J. van Dongen, and Rene A.J. Janssen, "Mechanistic Aspects of the Suzuki Polycondensation of Thiophenebisboronic Derivatives and Diidobenzenes Analyzed by MALDI-TOF Mass Spectrometry," 34 MACROMOLECULES 5386-5393 (2001).

⁵ Matthew R. Netherton and Gregory C. Fu, "Air-Stable Trialkylphosphonium Salts: Simple, Practical, and Versatile Replacements

(“Ans.”) at 3-11.

DISCUSSION

The Examiner found that Heeney, which refers to Jayakannan, describes a process for copolymerizing a first heteroaromatic compound having at least two functional halides (2,5-dihalothieno[2,3-b]thiophene) and a second heteroaromatic compound having at least two functional boron groups (bis(boronic) ester or acid) under formation of aryl-aryl C-C couplings (Suzuki conditions), wherein the functional halides and the boron groups are attached to a thiophene ring. Ans. 4. The Examiner acknowledged, however, that “[n]either Heeney nor Jayakannan teach [a] catalyst/ligand system obtained from a palladium catalyst and an organic phosphonium compound, wherein said palladium catalyst and organic phosphonium compound area [sic, are] added as separate entities and said catalyst/ligand is formed [sic, formed] in situ,” as required by claim 1. *Id.* The Examiner then relied on Netherton to support a conclusion that a person of ordinary skill in the art would have combined the teachings of Heeney and Netherton in the manner claimed. *Id.* at 4-5. Regarding secondary considerations, the Examiner dismissed the proffered evidence as unpersuasive because, in the Examiner’s view, one of the unexpected properties (relatively high molecular weight) was not recited in the claims

for Air-Sensitive Trialkylphosphines. Applications in Stoichiometric and Catalytic Processes,” 3 ORGANIC LETTERS 4295-4298, No. 26 (2001).

and the copolymer resulting from the combination of the prior art references “would [be] expect[ed] to have similar molecular weight as presently claimed polymer.” *Id.* at 8, 11.

The Appellants contend, inter alia, that Netherton “provides no suggestion to modify the combined disclosures of Heeney . . . and Jayakannan” because “the Suzuki coupling reactions investigated by Netherton . . . are not polymerization reactions.” App. Br. 7 (bolding removed). The Appellants further contend that the experimental results included in the current Specification, considered together with the experimental results reported in Jayakannan, constitute evidence of unexpected results in terms of polymer molecular weight and yield. App. Br. 8-9. In particular, the Appellants disagree with the Examiner’s evaluation of the proffered evidence. Reply Brief filed June 28, 2011 (“Reply Br.”) at 3-4 (referring to Ans. 8).

Thus, a dispositive issue arising from these contentions is:

Did the Appellants show prejudicial error in the Examiner’s overall obviousness conclusion for failure to properly evaluate the Appellants’ rebuttal evidence?

We agree with the Appellants that the Examiner’s treatment of the relied-upon evidence constituted reversible error. Our reasons follow.

When secondary considerations are present, “it is error not to consider them” or fail to “give the evidence . . . its due weight.” *In re Kao*, 639 F.3d 1057, 1067 (Fed. Cir. 2011).

In this case, the Examiner failed to provide any meaningful consideration of the proffered evidence. *In re Sullivan*, 498 F.3d 1345, 1353 (Fed. Cir. 2007) (The PTO “must give the [evidence] meaningful consideration before arriving at its conclusion [of obviousness].”).

It is undisputed that “[t]he organic phosphonium compound [recited in claim 1] forms a phosphine ligand in situ.” App. Br. 6 (underlining omitted); Ans. 7-11. It is also undisputed that neither Heeney nor Jayakannan discloses the in situ formation of a phosphine ligand, as required by claim 1. Ans. 4. As pointed out by the Appellants, Jayakannan reports relatively *lower* yields and *lower* molecular weights for polymers obtained by using a phosphine-containing catalyst, Pd(PPh₃)₄, when compared against polymers obtained by using a phosphine-free catalyst, Pd(OAc)₂. App. Br. 4-6; Jayakannan 5387 (Table 1). Additionally, Jayakannan’s phosphine-containing catalyst produced polymers having a molecular weight (M_w) of at most 7,300 g/mol. Jayakannan 5387 (Table 1). By contrast, the working examples of the current Specification show that the use of catalysts in accordance with the claimed invention provided polymers having significantly higher molecular weights at high yields. *See, e.g.*, Example 1 (yield = 53%; M_w = 216,000 g/mol).

The Examiner did not discuss the data in any meaningful way. Instead, the Examiner dismissed the evidence on the ground that the molecular weight was not recited in claim 1. Ans. 8. But binding precedent forbids such an approach. *In re Merchant*, 575 F.2d 865, 869 (CCPA 1978)

(“We are aware of no law requiring that unexpected results relied upon for patentability be recited in the claims.”). It is sufficient that the claim recites an element, which is not in the closest prior art, that causes the unexpected result. *In re Kao*, 639 F.3d at 1068.

As already indicated, the Examiner also stated that “the resulting copolymer [from the combination of the prior art references] would [be] expect[ed] to have similar molecular weight as [the] presently claimed polymer.” Ans. 11. That position, however, appears to be based on an incorrect understanding of the law. Under the Examiner’s logic, an applicant could never establish unexpected results because the *combination* of the prior art references would result in the claimed invention. In this case, the Appellants are relying on the data described in the working examples to show that the claimed invention provides unexpected results over the closest prior art, which is Heeney (referring to Jayakannan). App. Br. 4-6, 8-9; Reply Br. 3-4. A showing of unexpected results over the *closest prior art* can be used to rebut a prima facie case of obviousness. *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991).

Because the Examiner did not provide a meaningful review of the proffered evidence before weighing it against the evidence in support of obviousness,⁶ we cannot affirm.

⁶ *In re Kao*, 639 F.3d at 1072 (“Endo’s evidence of secondary considerations was insufficient to overcome this strong showing of primary considerations that rendered the claims at issue invalid.”).

Appeal 2011-012142
Application 11/504,114

SUMMARY

The Examiner's rejection under 35 U.S.C. § 103(a) of claims 1-10, 15-29, 36-40, 47-49, and 51-65 as unpatentable over Heeney in view of Jayakannan and Netherton is reversed.

REVERSED

tc