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Bell & Manning, LLC Michelle Manning 2801 West Beltline Highway Ste. 210 Madison, WI 53713			MELLOTT, JAMES M	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PADMA GOPALAN, DANIEL PATRICK SWEAT,
XIANG YU, and MYUNGWOONG KIM

Appeal 2019-006905
Application 15/404,775
Technology Center 1700

Before BEVERLY A. FRANKLIN, N. WHITNEY WILSON, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

WILSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner’s October 30, 2018 decision to finally reject claims 1–15 and 21 (“Final Act.”). We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Wisconsin Alumni Research Foundation (Appeal Br. 2).

CLAIMED SUBJECT MATTER

The claims on appeal are directed to a method of transferring a pattern into a substrate using a PtBuSt-b-P2VP block copolymer. A PtBuSt-b-2VP block copolymer is poly-tert-butyl styrene-block-poly2-vinyl-pyridine block copolymer (Appeal Br. 4). Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A method of transferring a pattern into a substrate using a PtBuSt-b-P2VP block copolymer, the method comprising:
 - depositing the PtBuSt-b-P2VP block copolymer over the substrate and subjecting the PtBuSt-b-P2VP block copolymer to conditions that induce it to self-assemble into a plurality of domains;
 - selectively removing some of the domains, such that the self-assembled PtBuSt-b-P2VP block copolymer layer defines a pattern over the substrate; and
 - transferring the pattern into the substrate to provide a patterned substrate.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Dobisz	US 2009/0311363 A1	December 17, 2009
Millward	US 2012/0046415 A1	February 23, 2012
Park	US 2014/0187054 A1	July 3, 2014

REJECTIONS

1. Claims 1–14 and 21 are rejected under 35 U.S.C. § 103 as unpatentable over Park in view of Dobisz.
2. Claim 15 is rejected under 35 U.S.C. § 103 as unpatentable over Park in view of Dobisz, and further in view of Millward.

DISCUSSION

The Examiner finds that Park is directed towards a method of patterning a substrate using a block copolymer, in which the block copolymer can be PtBuSt-b-P2VP (Final Act. 3, citing Park, Title and ¶ 42). The Examiner further finds that the PtBuSt-b-P2VP is suggested by Park's indication that its block copolymer may include a block copolymer containing two types of polymer components including styrene or a derivative thereof as a repeating unit in which the derivative of styrene includes tert-butylstyrene and 2-vinylpyridine, based on the following passages from Park (Final Act. 3, citing Park, ¶¶ 66 and 68). The Examiner also finds that Park discloses:

depositing the PtBuSt-b-P2VP BCP over the substrate and subjecting the BCP to conditions that induce it to self-assemble into a plurality of domains (claim 1);
selectively removing some of the domains, such that the self-assembled BCP layer defines a pattern over the substrate (¶ 77); and
using the BCP pattern as a mask and the like in a subsequent fabricating process (¶ 42)

(Final Act. 3–4). The Examiner further finds that Park does not teach details regarding use of the block copolymer pattern as a mask, but that these details are taught by Dobisz (Final Act. 4).

The Examiner determines that it would have been obvious to use the process steps disclosed by Dobisz with the block copolymer mask disclosed by Park because “the process of [Dobisz] is an art known subsequent fabrication process in the art of using block copolymers and thus would have predictably been a suitable post fabrication process” (*id.*).

Appellant's first argument is that, contrary to the Examiner's findings, PtBuSt-b-P2VP is not disclosed by Park (Appeal Br. 4). Appellant argues

that although Park discloses that its block copolymers can include a polystyrene block or a polystyrene derivative block, it does not disclose the use of block copolymer where both blocks are polystyrene derivative blocks, which is what characterizes the claimed PtBuSt-b-P2VP block copolymer (*id.*). As articulated by Appellant:

For purposes of simplicity, polystyrene will be abbreviated herein as “PS” and polystyrene derivative will be abbreviated herein as “PSD”. Thus, while Park teaches BCPs having the structure PS-b-PSD, Park does not teach BCPs having the structure PSD-b-PSD

(Appeal Br. 4–5).

The Examiner supports his findings regarding Park’s teachings on the structure of its block copolymers from the following language in Park: “The examples of the BCP [block copolymer] may include a BCP consisting of two types of polymer components including styrene *or* a derivative thereof as a repeating unit” (Park, ¶ 66, emphasis added). According to Appellant, the use of the term “or” in the foregoing sentence necessarily means that Park’s BCP can include either a styrene block or a styrene derivative block, but cannot include two different styrene derivative blocks (Appeal Br. 5).

Appellant advances several reasons why the Examiner’s interpretation of the sentence in question is incorrect. First, according to Appellant, the Examiner’s interpretation would allow for a BCP with styrene blocks and styrene blocks, which would be a homopolymer, not a copolymer (*id.*). This argument is not persuasive, because a person of skill in the art would have understood that a block copolymer is, in fact, a copolymer, and thus could not solely consist of styrene monomers.

Second, Appellant points to the remainder of Park’s paragraph 66, which identifies numerous examples of block copolymers which consist of

“a polymer component including at least one selected from styrene or a derivative thereof as a repeating unit” and a different polymer unit (Appeal Br. 6). Appellant argues that this disclosure in paragraph 66, along with the fact that none of the 18 styrene or styrene-derivative containing BCPs listed in paragraph 71 of Park includes two styrene-derivative blocks means that “Park does not teach the specific BCP (PtBuSt-b-P2VP) recited in claim 1” (Appeal Br. 6–7).

We agree with Appellant that Park does not specifically disclose the use of PtBuSt-b-P2VP. The totality of Park’s disclosure, as discussed in detail at pages 4–7 of the Appeal Brief, shows that Park does not specifically contemplate the use of a PSD-b-PSD block copolymer nor, therefore, the use specifically of the claimed PtBuSt-b-P2VP block copolymer. To establish a prima facie case of obviousness, the Examiner must show that each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). In this instance, the Examiner has not provided an adequate explanation of why a person of ordinary skill in the art would have modified the teachings of Park to produce a PSD-b-PSD block copolymer. Without being motivated to produce that general structure, a person of skill in the art would have had no reason to use the PtBuSt-b-P2VP block copolymer required by claim 1.

Accordingly, we reverse the rejection of claim 1 over Park and Dobisz. Because each of the remaining claims depends from claim 1, we also reverse the rejections of the remaining claims (the disclosure of Millward does not remedy the foregoing deficiencies of Park).

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1-14, 21	103	Park, Dobisz		1-14, 21
15	103	Park, Dobisz, Millward		15
Overall Outcome				1-15, 21

REVERSED