

NOTE: This disposition is nonprecedential.

**United States Court of Appeals
for the Federal Circuit**

DSS TECHNOLOGY MANAGEMENT, INC.,
Plaintiff-Appellant

v.

**TAIWAN SEMICONDUCTOR MANUFACTURING
COMPANY, LTD., TSMC NORTH AMERICA,
SAMSUNG ELECTRONICS CO., LTD., SAMSUNG
ELECTRONICS AMERICA, INC., SAMSUNG
TELECOMMUNICATIONS AMERICA, LLC,
SAMSUNG SEMICONDUCTOR, INC., SAMSUNG
AUSTIN SEMICONDUCTOR, L.L.C.,**
Defendants-Appellees

2015-1684

Appeal from the United States District Court for the
Eastern District of Texas in No. 2:14-cv-00199-RSP,
Magistrate Judge Roy S. Payne.

Decided: March 22, 2016

CHRISTIAN JOHN HURT, Nix Patterson & Roach LLP,
Irving, TX, argued for plaintiff-appellant. Also represented
by DEREK TOD GILLILAND, Daingerfield, TX; WILLIAM
ELLSWORTH DAVIS III, The Davis Firm, PC, Longview, TX.

SCOTT A. CUNNING II, Haynes & Boone, LLP, Washington, DC, argued for defendants-appellees Taiwan Semiconductor Manufacturing Company, Ltd., TSMC North America. Also represented by DAVID H. HARPER, DEBRA JANECE MCCOMAS, STEPHANIE SIVINSKI, Dallas, TX; KAREN S. PRECELLA, Fort Worth, TX.

JARED BOBROW, Weil, Gotshal & Manges LLP, Redwood Shores, CA, argued for defendants-appellees Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Telecommunications America, LLC, Samsung Semiconductor, Inc., Samsung Austin Semiconductor, L.L.C. Also represented by CHRISTOPHER MARANDO, Washington, DC; ALLEN FRANKLIN GARDNER, MICHAEL EDWIN JONES, Potter Minton PC, Tyler, TX.

Before TARANTO, CLEVINGER, and HUGHES, *Circuit Judges*.

TARANTO, *Circuit Judge*.

DSS Technology Management, Inc. owns U.S. Patent No. 5,652,084, which describes and claims methods of making patterns in semiconductor wafers. DSS sued a number of companies, alleging that they manufacture products by using processes covered by claims 1–7 and 10 the '084 patent or sell products made by such processes. After the district court construed the claims, the parties stipulated to a judgment of noninfringement. DSS appeals the district court's construction of the term "patterned layer." *DSS Tech. Mgmt., Inc. v. Taiwan Semiconductor Mfg. Co.*, No. 2:14-CV-199-RSP, 2015 WL 1737732, at *3–6 (E.D. Tex. Apr. 9, 2015). We affirm.

BACKGROUND

The '084 patent discloses a lithographic patterning process "to provide for a relatively reduced pitch for

features of a patterned layer.” ’084 patent, col. 1, lines 40–41. In the description of the prior art, the ’084 patent describes a typical lithography process: First, “photoresist is deposited over the layer to be patterned and is exposed to ultraviolet radiation through a mask that defines the pattern to be formed in the photoresist.” *Id.*, col. 1, lines 19–22. After irradiation, “[t]he photoresist is then developed to form a patterned photoresist layer over the underlying layer to be patterned. Those portions of the underlying layer that are not covered by photoresist may then be etched using suitable etch techniques and chemistries.” *Id.*, col. 1, lines 22–26. By such etching, “[t]he pattern in the photoresist is [] replicated in the underlying layer.” *Id.*, col. 1, lines 26–27.

According to the patent, however, the described conventional lithography methods “limit the size and density with which semiconductor devices may be fabricated.” *Id.*, col. 1, lines 28–30. The patent describes a purportedly novel two-stage process to enable smaller, denser fabrication. In the first stage, “a first imaging layer is formed over the semiconductor wafer,” “[t]he first imaging layer is patterned in accordance with a first pattern to form a first patterned layer,” and that “patterned layer is stabilized.” *Id.*, col. 1, lines 49–52. Then “[a] second imaging layer is formed over the first patterned layer such that the first patterned layer is surrounded by the second imaging layer. The second imaging layer is patterned in accordance with a second pattern to form a second patterned layer.” *Id.*, col. 1, lines 52–56. The result of the process is a “single patterned layer [] formed from the patterning of [the first] imaging layer . . . and the subsequent patterning of [the second] imaging layer.” *Id.*, col. 7, lines 38–40. The resulting (single, unified) patterned layer may then “serve[] as a mask in patterning an underlying layer,” so the pattern is “replicated in the underlying layer.” *Id.*, col. 12, lines 45–53.

Claim 1, the only independent claim at issue, states:

1. A lithography method for semiconductor fabrication using a semiconductor wafer, comprising the steps of:

- (a) forming a first imaging layer over the semiconductor wafer;
- (b) patterning the first imaging layer in accordance with a first pattern to form a first patterned layer having a first feature;
- (c) stabilizing the first patterned layer;
- (d) forming a second imaging layer over the first pattern layer; and
- (e) patterning the second imaging layer in accordance with a second pattern to form a second patterned layer having a second feature distinct from the first feature, wherein the second patterned layer and the first patterned layer form a single patterned layer, and wherein the first and second features which are formed relatively closer to one another than is possible through a single exposure to radiation.

Id., col. 13, lines 6–24. Claims 2 and 3 each depend on claim 1, with claim 2 adding that “the first imaging layer includes a positive photoresist” and claim 3 adding that “the second imaging layer includes a positive photoresist.” *Id.*, col. 13, lines 25–28. Claims 4 and 5, which also depend on claim 1, add limitations to the patterning steps. Claim 4 reads:

4. The method of claim 1, wherein the patterning step (b) includes the steps of:
- (i) exposing a portion of the first imaging layer to radiation; and

- (ii) developing the first imaging layer such that the exposed portion dissolves to form the first patterned layer.

Id., col. 13, lines 29–35. Claim 5 adds the same steps to patterning step (e). *Id.*, col. 13, lines 36–43.

DSS brought the present patent-infringement suit against Taiwan Semiconductor Manufacturing Company, Ltd., TSMC North America, TSMC Development, Inc., Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Telecommunications America, LLC, Samsung Semiconductor, Inc., Samsung Austin Semiconductor L.L.C., and NEC Corporation of America.¹ DSS alleged that the defendants manufacture semiconductor products using processes covered by the '084 patent or sell products made by such processes.

The district court construed several claim terms. It adopted the parties' agreed-to constructions that the first imaging layer is "a first layer of photoresist or other radiation-sensitive material" and the second imaging layer is "a second layer of photoresist or other radiation-sensitive material." *DSS*, 2015 WL 1737732, at *3. The parties also agreed to the district court's proposal that "patterning the [first/second] imaging layer" means "exposing an imaging layer to radiation in accordance with a specific pattern and developing the imaging layer so that portions of the imaging layer laying outside of the pattern are dissolved in the developer, thereby forming patterned portions and spaces of the imaging layer." *Id.* (bracketed material in original). Then the court adopted the claim construction at issue here: "first patterned layer having a first feature" and "second patterned layer having a second

¹ TSMC Development, Inc. and NEC Corporation of America are not appellees in this court because they settled with DSS.

feature,” the court ruled, mean, respectively, “a layer containing the portions and spaces of the [first/second] imaging layer that remain after the [first/second] patterning step.” *Id.* at *6 (bracketed material in original).

In light of the district court’s claim construction, the parties stipulated to a judgment of noninfringement. The stipulation explained the reason: “the layer alleged by DSS to be the ‘first patterned layer having a first feature’ (namely, a layer *underlying* the first imaging layer) does not contain the portions and spaces of the first imaging layer that remain after exposure and development of the first imaging layer.” J.A. 39 (emphasis added). The district court entered a judgment of noninfringement for defendants and dismissed the defendants’ other claims, counterclaims, and defenses without prejudice.

DSS appeals. We have a final judgment before us. *See Atlas IP, LLC v. Medtronic, Inc.*, 809 F.3d 599, 604–05 (Fed. Cir. 2015). We have jurisdiction under 28 U.S.C. § 1295(a)(1).

DISCUSSION

We review a district court’s claim construction *de novo* where, as here, it is not based on any evidence about extra-patent understandings of language or other facts. *See Avid Tech., Inc. v. Harmonic, Inc.*, 812 F.3d 1040, 1044–45 (Fed. Cir. 2016).

DSS disputes the construction of “patterned layer.” As their noninfringement stipulation evinces, the parties here agree on the meaning of the district court’s construction. Under that construction, the patterned layer consists of material of the imaging layer itself—what remains (material and spaces) after the patterning process has removed some of the material—and cannot include other material configured according to the pattern. We conclude that the district court’s construction is correct.

The language of the claim—“patterning the first imaging layer in accordance with a first pattern to form a first patterned layer”—points strongly toward the district court’s construction. It indicates that the first patterned layer is the immediate result of performing the patterning process itself, not of that process plus an additional unclaimed process. The claim does not identify any steps in the creation of the patterned layer apart from patterning. And DSS does not dispute the district court’s construction of “patterning” to mean “exposing an imaging layer to radiation in accordance with a specific pattern and developing the imaging layer so that portions of the imaging layer laying outside of the pattern are dissolved in the developer, thereby forming patterned portions and spaces of the imaging layer.” *DSS*, 2015 WL 1737732, at *3. Patterning involves applying a pattern to the imaging layer, irradiating the imaging layer, and developing the imaging layer to remove portions of the imaging layer. In the absence of any identification of any other steps, the immediate result of “patterning” is the “patterned layer,” which is necessarily the remaining material (and spaces) of the imaging layer.

That the claim uses two terms (“imaging layer,” “patterned layer”) to refer to the same material does not detract from this conclusion. DSS itself agrees that the patterned layer can be made of the same material as the imaging layer, fully answering any objection about different terminology for the same material. The terms merely refer to the same material at different stages of the process.

The specification’s description of the patterning process supports the district court’s understanding that the patterned layer is formed out of the same material as the imaging layer. The imaging layer is made of a radiation-sensitive material, such as “a suitable positive photoresist, . . . a suitable negative photoresist, a suitable radiation-sensitive polyimide, or other suitable radiation-

sensitive materials for example.” ’084 patent, col. 3, lines 34–42 (first imaging layer); *see id.*, col. 5, line 66, through col. 6, line 8 (second imaging layer). The imaging layer is patterned in accordance with a pattern to form a patterned layer according to the following steps, applicable to patterning either imaging layer. *See id.*, col. 3, lines 49–51; *id.*, col. 6, lines 12–14. The imaging layer is first “exposed through the first mask using any suitable form of radiation.” *Id.*, col. 3, lines 65–66; *see id.*, col. 6, lines 26–27. The mask blocks radiation, such that some portions of the layer are exposed to radiation and some are not. *Id.*, col. 3, lines 54–64; *see id.*, col. 6, lines 23–25. The imaging layer is then “developed in a suitable developer to form a first patterned layer.” *Id.*, col. 4, lines 5–6; *see id.*, col. 6, lines 51–53. When the imaging layer is made of positive-tone material, “[t]hat portion of imaging layer 220 that has not been exposed to radiation is relatively insoluble in the developer, and thus remains to form first patterned layer 232.” *Id.*, col. 4, lines 9–12; *see id.*, col. 6, lines 56–59. Conversely, when the imaging layer is made of negative-tone material, “[t]hat portion of imaging layer 220 exposed to radiation through the first mask is relatively insoluble in the developer and thus remains to form first patterned layer 232. That portion of imaging layer 220 that has not been exposed to radiation is soluble in the developer and is thus dissolved from imaging layer 220.” *Id.*, col. 4, lines 24–29; *see id.*, col. 7, lines 9–14. This description of the process is naturally read to be treating the “patterned layer” as what remains of the imaging layer.

More generally, the specification consistently describes the patterned layer as what remains of the imaging layer. *See id.*, col. 9, lines 53–63 (“For step 350 of FIG. 6, the imaging layer is developed to form a patterned layer. Imaging layer 420 may be developed in any suitable developer to form a patterned layer that includes portions 431, 432, and 433 as illustrated in FIG. 11. As

portions 431, 432, and 433 of imaging layer 420 have been stabilized, portions 431, 432, and 433 are relatively insoluble in developer and thus undergo relatively minimal, if any, dissolution. Portions 431, 432, and 433 thus remain to form features 431, 432, and 433 for the patterned layer after development. The remaining portion of imaging layer 420 is dissolved from imaging layer 420 in the developer.”); *id.*, col. 12, lines 4–17 (“For step 540 of FIG. 12, the imaging layer is developed to form a patterned layer. . . . That portion of imaging layer 620 that has not been exposed to radiation is also relatively insoluble in the developer, and thus remains to form features 631 and 633 for the patterned layer.”).

Although DSS points to two related passages of the specification as contrary to the district court’s construction, we think that those passages are actually supportive of that construction. One passage, in the description of the prior art, states that “photoresist is deposited over the layer to be patterned and is exposed to ultraviolet radiation through a mask.” *Id.*, col. 1, lines 19–22. After irradiation, the photoresist is “developed to form a patterned photoresist layer over the underlying layer to be patterned.” *Id.*, col. 1, lines 22–24. Those steps are similar to steps claimed in the patent—forming an imaging layer and patterning that imaging layer to form a patterned layer. The passage then specifies *additional* steps through which the patterned photoresist layer can be used to pattern an underlying layer: “Those portions of the underlying layer that are not covered by photoresist may then be etched using suitable etch techniques and chemistries. The pattern in the photoresist is thus replicated in the underlying layer.” *Id.*, col. 1, lines 24–27. Although this passage describes creating a pattern in an underlying layer, it notably identifies additional steps, described in different language, for doing so: suitable etching techniques and chemistries for replicating the pattern. That passage tends to reinforce, rather than

undermine, the distinction between the “patterned layer” immediately created by patterning the imaging layer and transferring the pattern to some other layer.

This understanding is supported by a related passage near the end of the written description, which explains that the claimed methods “may be used, for example, to form a single patterned layer that serves as a mask in patterning an underlying layer, such as layers 210, 410, and 610 respectively.” *Id.*, col. 12, lines 45–48. The specification states that “[t]he underlying layer may be patterned using a suitable etch technique and chemistry,” such that “the pattern in the mask layer, such as the single patterned layer illustrated in FIGS. 5, 11, and 16, becomes replicated in the underlying layer.” *Id.*, col. 12, lines 48–53. Like the prior-art passage discussed above, this passage, by its language, reinforces the distinction between the patterned layer as what remains of the imaging layer as a result of its being patterned and an underlying layer that has been subjected to additional steps for transferring the pattern.

Principles favoring claim constructions that preserve differentiation of scope among different claims do not defeat the district court’s construction of claim 1. Claims 4 and 5 provide additional details for patterning steps (b) and (e) of claim 1. *Id.*, col. 13, lines 29–43. Claim 4 requires patterning step (b) to include “(i) exposing a portion of the first imaging layer to radiation; and (ii) developing the first imaging layer such that the *exposed portion dissolves* to form the first patterned layer.” *Id.*, col. 13, lines 29–35 (emphasis added). Claim 5 requires the same steps for patterning step (e), in which the second imaging layer is patterned. *Id.*, col. 13, lines 36–43. Claims 4 and 5 require that the imaging layer is positive-tone—that is, the material becomes more soluble upon exposure to radiation. *See id.*, col. 3, line 54, through col. 4, line 12 (describing patterning a positive-tone imaging material). In contrast, the parties agree that claim 1

covers both positive- and negative-tone materials. Oral Arg. at 14:47–15:07, 17:55–18:04. Under the district court’s claim construction, therefore, claims 4 and 5 are different in scope from—narrower than—claim 1.

DSS suggests that this understanding of claims 4 and 5 cannot be correct because it renders them equivalent in scope to claims 2 and 3, which respectively require the first and second imaging layer to be a positive “photoresist.” But while claims 2 and 3 require the imaging-layer material to be a positive photoresist, claims 4 and 5 require only that “the exposed portion dissolves” after irradiation, indicative of a positive-tone material. DSS does not argue that all positive-tone materials are positive photoresists. And the specification is consistent with the understanding that not all radiation-sensitive materials are photoresists. ’084 patent, col. 3, lines 54–56 (“suitable positive photoresist or a suitable positive-tone radiation-sensitive polyimide”); *cf. id.*, col. 3, lines 41–42 (“suitable negative photoresist, a suitable radiation-sensitive polyimide, or other suitable radiation-sensitive materials for example”). The parties’ agreed-to construction of “imaging layer” similarly treats photoresist as a proper subset of radiation-sensitive materials, as opposed to an umbrella term that encompasses all radiation-sensitive materials. *See DSS*, 2015 WL 1737732, at *3. Because claims 4 and 5 recite positive-tone materials, while claims 2 and 3 recite positive photoresists, there is a difference in scope under the district court’s construction of “patterned layer.” Accordingly, there is no claim-differentiation basis for rejecting that construction.

CONCLUSION

For the foregoing reasons, we conclude that the district court correctly construed the claims, and we affirm the district court’s judgment of noninfringement.

AFFIRMED