ROBERT T. HASLAM (Bar No. 71134)
rhaslam@cov.com
MICHAEL K. PLIMACK (Bar No. 133869)
mplimack@cov.com
CHRISTINE SAUNDERS HASKETT (Bar No. 188053)
chaskett@cov.com
SAMUEL F. ERNST (Bar No. 223963)
sernst@cov.com
COVINGTON & BURLING LLP
One Front Street
San Francisco, CA 94111
Telephone: (415) 591-6000
Facsimile: (415) 591-6091

ALAN H. BLANKENHEIMER (Bar No. 218713)
ablankenheimer@cov.com
LAURA E. MUSCHAMP (Bar No. 228717)
lmuschamp@cov.com
JO DALE CAROTHERS (Bar No. 228703)
jcarothers@cov.com
COVINGTON & BURLING LLP
9191 Towne Centre Drive, 6th Floor
San Diego, CA 92122-1225
Telephone: (858) 678-1800
Facsimile: (858) 678-1600

Attorneys for Defendants and Counterclaimants SAMSUNG ELECTRONICS CO., LTD., SAMSUNG SEMICONDUCTOR, INC., SAMSUNG AUSTIN SEMICONDUCTOR, LLC, SAMSUNG ELECTRONICS AMERICA, INC., SAMSUNG TELECOMMUNICATIONS AMERICA, LLC, and SAMSUNG DIGITAL IMAGING CO., LTD.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

ADVANCED MICRO DEVICES, INC., et al.,

Plaintiffs and Counterdefendants,

v.

SAMSUNG ELECTRONICS CO., LTD., et al.,

Defendants and Counterclaimants.

Case No. 3:08-CV-0986-SI

SAMSUNG'S OPPOSITION TO AMD'S MOTION FOR JUDGMENT ON THE PLEADINGS OF NO INEQUITABLE CONDUCT RELATING TO U.S. PATENT NO. 5,545,592

DATE: February 12, 2009
TIME: 9:00 a.m.
COURTROOM: 10, 19th Floor
JUDGE: The Honorable Susan Illston

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I. INTRODUCTION

For the second time, AMD attempts to dismiss Samsung's counterclaim of inequitable conduct in the prosecution of U.S. Patent 5,545,592 ("'592" or "Iacoponi Patent") for failure to plead the cause of action with the necessary specificity. For the second time, AMD asserts the same arguments. And for the second time, this Court should reject AMD's efforts. Armed with a single case—and overstating its holdings—AMD hopes that the entire landscape has changed, and that its recycled arguments will now carry the day. As made clear in *Exergen Corp. v. Walmart Stores, Inc.*, 575 F.3d 1312, 1327 (Fed. Cir. 2009), Samsung must plead the facts and circumstances of John Iacoponi's inequitable conduct with particularity, identifying "the specific who, what, when, where, and how of the material misrepresentation or omission" to the Patent and Trademark Office. But that is precisely what Samsung has already done. *Exergen* has not profoundly altered the law regarding inequitable conduct; the case has merely clarified the standard that has long governed. *See* Fed. R. Civ. P. 9(b).

AMD presents *Exergen* as a magic incantation that Samsung must chant in order to survive a motion for judgment on the pleadings. Yet *Exergen* was hardly so formalistic as to require this Court to abandon common sense in favor of a mechanical application of inapposite criteria. While under the facts of *Exergen*, the party asserting claims of inequitable conduct failed to satisfy Federal Rule of Civil Procedure 9(b), the situation here is very different. Samsung has alleged who committed inequitable conduct and when the accused activity took place, has put AMD on notice of what claim limitations were at issue, and has provided ample information regarding the materiality and non-cumulative nature of the withheld references. In contrast, the party alleging inequitable conduct in *Exergen* declined even to specify *who* had done anything wrong.

The facts as alleged are simple: John Iacoponi submitted only a handful of prior art references to the USPTO in the prosecution of the '592 patent. This in itself is highly suspicious, given the intensely crowded field in which Iacoponi was working. In fact, Samsung alleges that Iacoponi withheld over sixty relevant references from VLSI Multilevel Interconnection Conferences ("VMIC")—at the time, the premier conference in the field of Iacoponi's invention—precisely because they were material and bore on the patentability of his claims.

Samsung has properly alleged that Iacoponi committed inequitable conduct in failing to disclose to the USPTO dozens of references, of which he was aware, that addressed the very same concepts that Iacoponi was simultaneously seeking to patent.

II. SUMMARY OF FACTS AND PROCEDURAL HISTORY

This is not the first time that this Court has considered the adequacy of Samsung's pleadings regarding inequitable conduct, nor is it the first time that the Court contemplated nearly identical arguments brought by AMD. On March 11, 2009, Samsung moved for leave to amend its Answers and Counterclaims. Dkt. 120. AMD repeatedly opposed the motion—both in its Opposition and in a Surreply—on the grounds that amendment was futile and contradicted by John Iacoponi's self-serving deposition testimony, in which he denied engaging in inequitable conduct. Dkt. 201, 214. In particular, AMD argued that Samsung failed to plead its claim with sufficient particularity under Federal Rule of Civil Procedure 9(b) by failing to allege the materiality of the withheld references or intent to deceive the USPTO, and further contended that Samsung "has no factual support for its inequitable conduct allegations" regarding over 60 VMIC references. Dkt. 201 at 8-12. The Court rejected AMD's contentions and granted Samsung leave to amend. Dkt. 234.

AMD now argues that Samsung failed to plead its claim with sufficient particularity under Federal Rule of Civil Procedure 9(b) by failing to allege the materiality of the withheld references or intent to deceive the USPTO, and further contends that Samsung lacks factual support for its claims. Nothing has changed except for a single Federal Circuit Case: *Exergen*. AMD seeks a second opportunity to relitigate a lost battle in the hope that the law has changed profoundly. But it has not.

The core of Samsung's allegations—which must be accepted as true on this motion for judgment on the pleadings—remains the same: John Iacoponi attended a series of prominent conferences between 1993 and 1996 that were well-known in his industry. First Amended Answer and Counterclaims "FAAC" ¶¶ 162, 170. These conferences involved the presentation of numerous papers and abstracts that were distributed to participants. John Iacoponi himself co-authored one of these papers that was presented in 1993. He had knowledge of the paper, the information within it, and its materiality to his '592 patent application. He also knew of over 60 additional papers from

the same conference series, as well as the materiality of these documents, but declined to disclose them to the USPTO, with the intent to deceive. AMD seeks to avoid the thrust of these allegations by relying on a mechanical interpretation of *Exergen*, and that effort must fail.

III. ARGUMENT

A. Standard Under 12(c)

Judgment on the pleadings is only appropriate when "even if all material facts in the pleading are accepted as true, the moving party is entitled to judgment as a matter of law." *Berryessa for All v. U.S. Bureau of Reclamation*, No. C 07-259 SI, 2007 WL 4209551, at *2 (N.D. Cal. Nov. 27, 2007) (Illston, J.) (citation omitted). Motions under Federal Rule of Civil Procedure 12(c) are "improper when the district court goes beyond the pleadings to resolve an issue," as "the allegations of the non-moving party must be accepted as true[.]" *Hal Roach Studios, Inc. v. Richard Feiner and Co.*, 896 F.2d 1542, 1550 (9th Cir. 1990). A motion under Rule 12(c) "is evaluated according to virtually the same legal standard as a motion to dismiss under FRCP 12(b)(6), in that the pleadings are construed in the light most favorable to the non-moving party." *Marshall v. Cargill, Inc.*, No. C 08-02422 WHA, 2008 WL 2543210, at *4 (N.D. Cal. June 20, 2008) (citation omitted).

To state its claim of inequitable conduct, Samsung must merely allege that someone involved in the prosecution of the '592 patent "made an affirmative misrepresentation of material fact, failed to disclose material information, or submitted false material information, and . . . intended to deceive" the USPTO. *Cargill, Inc. v. Canbra Foods, Ltd.*, 476 F.3d 1359, 1363 (Fed. Cir. 2007) (citation omitted).

B. Samsung Has Adequately Pled Claims with Requisite Particularity and Need Not Amend Its Answers and Counterclaims.

AMD accuses Samsung of a number of pleading deficiencies. Each is specious. AMD argues that Samsung failed to specify: "(1) what claims and claim limitations of the Iacoponi '592 patent are impacted by its allegations; (2) where the allegedly material information is located within each of its Alleged Inequitable Conduct References; and (3) the claim limitations, or combination of claim limitations, from the Iacoponi '592 patent that are disclosed in the Alleged Inequitable Conduct References, but are missing from the prior art of record" for the '592 patent. Mot. at 6.

AMD misconstrues the requirements of *Exergen* and interprets the case as requiring formalistic incantations to survive a motion to dismiss—even when Samsung's pleadings are, under the circumstances, specific enough under Rule 9(b).

In *Exergen*, a constellation of factors—and not one or two technical pleading deficiencies—compelled denial of leave to bring inequitable conduct claims. The accused infringer in *Exergen* presented a large number of failings which, *collectively* "are fatal"; there is no indication that any one error compelled the panel to refuse leave to amend. *Exergen*, 575 F.3d at 1330. Yet AMD styles *Exergen* as requiring pleaders to conform to a rigid set of requirements to survive judgment on the pleadings, despite the clear differences between the deficient pleadings in *Exergen* and the more specific pleadings offered here. For this reason, the facts of *Exergen* are inapposite.

1. Unlike the *Exergen* Defendants, Samsung Has Identified the Specific Person Who Engaged in Inequitable Conduct.

First—and critically—the accused infringer in *Exergen* explicitly failed to identify "who" had engaged in inequitable conduct. The pleading merely noted that the patent at issue "is unenforceable due to inequitable conduct by Exergen, its agents and/or attorneys during the prosecution of the application for the [patent] before the PTO." *Exergen*, 575 F.3d at 1325. The pleader thus "fail[ed] to name the specific individual associated with the filing or prosecution" of the patent and "who both knew of the material information and deliberately withheld or misrepresented it." *Id*. at 1329.

AMD cannot argue the same regarding Samsung's pleadings. Samsung alleges that "Mr. [John] Iacoponi did not disclose the Iacoponi paper, nor any other papers authored by him relating to the formation of contacts in semiconductor devices, to the attorneys prosecuting the '592 patent, nor to the USPTO in connection with the prosecution of the '592 patent." FAAC ¶ 169. Moreover, Samsung avers that "Mr. Iacoponi withheld the materials distributed at the VMIC conferences held between and including June of 1993 to June of 1996, including the references listed . . . and the Iacoponi paper, from the USPTO with an intent to deceive the USPTO." *Id*. at ¶ 170; *see also id.* at ¶¶ 166-68.

Unlike the party in *Exergen,* Samsung makes clear that it was John Iacoponi who was exposed to references that were material and non-cumulative to the art submitted to the USPTO,

and that he declined to submit the art despite knowing of the information contained in his own paper and others. AMD knows precisely whom to investigate as well as the relevant time frame, and thus has sufficient notice to prepare an adequate defense.

2. Samsung's Existing Allegations Make Clear Which Claims and Claim Limitations are Disclosed by the References Withheld by John Iacoponi.

AMD further faults Samsung for failing to identify "which claims, and which limitations in those claims, the withheld references are relevant to, and where in those references the material information is found[.]" *Exergen*, 575 F.3d at 1329; Dkt. 273 at 7-8. While AMD suggests that Samsung's allegation that the withheld references "disclosed processes for forming nitrided contacts in semiconductor devices, including processes utilizing nitrogen ionized in a plasma" is insufficient under *Exergen*, even a cursory comparison of this allegation to the claims and claim limitations of the '592 patent makes it clear that Samsung's averment is more revealing than those of *Exergen*. *See* FAAC ¶ 165. AMD has accused Samsung of infringing two—and only two—claims of the '592 patent: independent claim 1, and dependent claim 4. *See* Declaration of Jesse R. Goodman in Support of Samsung's Opposition To AMD's Motion for Judgment on The Pleadings of No Inequitable Conduct Relating To U.S. Patent No. 5,545,592 ("Goodman Decl.") at ¶ 3.

Claim 1 reads:

"1. A method for forming a contact to a semiconductor body, said method comprising the steps of:

forming a metal silicide layer on said body;

exposing said metal silicide layer to nitrogen ionized in a plasma, thereby converting a portion of said metal silicide layer to a first metal nitride layer;

depositing a layer of a second metal nitride over said metal silicide layer, such that said second metal nitride layer overlays and engages said first metal nitride layer; and

depositing a layer of a second metal over said second metal nitride layer." Goodman Decl., Ex. 1 at Col. 4 L. 34-45.

Claim 4 reads:

"4. The method of claim 1, wherein said metal silicide is titanium silicide, and wherein the second metal nitride is titanium nitride." Goodman Decl., Ex. 1 at Col. 4, L. 57-59.

When viewed in the context of the '592 patent, therefore, Samsung's allegations are more particular and detailed than AMD suggests. Samsung's allegation regarding "nitrided contacts" draws AMD's and the Court's attention to the claim limitations involving nitride layers—in this case, each claim limitation within claims 1 and 4 that involves nitrided layers and their substrates (*i.e.* the conversion of a metal silicide to a first metal nitride; the deposition of a second metal nitride layer; and the deposition of a metal over the second metal nitride layer). *See* FAAC ¶ 165. Furthermore, Samsung's allegation concerning "nitrogen ionized in a plasma" is clearly aimed at the limitation in claim 1 that discloses "exposing said metal silicide layer to nitrogen ionized in a plasma," as the language of Samsung's allegations perfectly tracks that of the '592 patent.[1] *See id.* and Goodman Decl., Ex. 1 at Col. 4, L. 37-38.

AMD further maligns Samsung for failing to identify specifically "where" the relevant material in each abstract may be found. This argument ignores the fact that the vast majority of the references cited are extremely short abstracts, some less than a page in length. Indeed, the median length of an accused reference is 3 pages. *See* Goodman Decl. ¶ 4. Samsung is not alleging that a book or even a set of long publications contain critical material regarding the '592 somewhere within their vast confines: Samsung merely avers that a number of concise—and even terse—abstracts contain significant information that was not properly disclosed to the USPTO.

AMD thus urges this Court to abandon common sense in favor of a ritualistic reading of *Exergen*, a reading that apparently requires Samsung to invoke certain particularized phrases in order to put AMD on notice of its claims. Yet the claims and claim limitations at issue are already clear from Samsung's existing pleadings. Neither dismissal nor amendment is required.

[1] As a practical matter, Samsung has given further detail regarding the material information disclosed within the VMIC references in its response to AMD's Interrogatory Number 46. Among other information, Samsung indicated that certain papers are highly material because they disclose "the sputtering of TiN [nitrided titanium] onto a silicide, and therefore the exposure of the silicide to nitrogen ionized in a plasma"; other references relate to "multilayered TiN" (*i.e.* multiple metal nitride layers); and other references concern "the conditions for forming titanium silicide" (which is subsequently nitrided in the '592 process through "nitrogen ionized in a plasma"). Finally, Samsung noted that the withheld materials disclosed important "relevant experimental data" regarding metal nitrides, silicide formation, and the use of plasmas that are not otherwise disclosed in the '592 patent or the art disclosed to the USPTO. *See* Goodman Decl., Ex. 2. AMD cannot thus argue that it has suffered any prejudice from Samsung's pleadings.

3. Samsung Has Adequately Identified How the Cited References Are Material and Non-Cumulative to the Art Cited to the USPTO and to the Patentability of the Claims of the '592 Patent.

AMD further argues that Samsung's pleadings are deficient because they do not disclose with particularity how the withheld references are material or non-cumulative. And again, AMD forsakes a common sense understanding of *Exergen* in an attempt to portray the case as requiring particular "magic words" rather than sufficient information to put AMD on notice of Samsung's claims. As already noted above, only two claims of the '592 patent—only one of which is an independent claim—are at issue in this suit, and this sole independent claim contains few limitations. Confusion about the materiality of the withheld VMIC references is not likely, especially considering the context.

Even the very titles of the cited references signal their importance when viewed alongside the '592 patent. *See, e.g.*,

- *Self-Aligned Barrier Layer Formation on $TiSi_2$ [i.e. titanium silicide] Layer with N_2 Plasma Treatment*
- *A Stable Plasma Treated CVD Titanium Nitride Film for Barrier/Glue Layer Applications*
- *Multilayered Titanium Nitride Layer Processing for Improved Integrity Results*.

FAAC ¶ 165. Samsung already avers that the VMIC references "were highly material to the patentability of the claims of the '592 patent in that they disclosed processes form forming nitrided contacts in semiconductor devices, including processes utilizing nitrogen ionized in a plasma." *Id.* Furthermore, Samsung drew particular attention to the VMIC reference co-authored by John Iacoponi himself, "Single Chamber Implementation of a Coherent Ti/TiN process for Sub-Half Micron Technologies," noting that the reference "was highly material to the patentability of the claims of the '592 patent in that addressed several of the same concepts as the claims of the '592 patent, including the use of titanium and titanium nitride to form contacts in semiconductor devices." FAAC ¶ 168.

AMD alleges that Samsung infringes claims 1 and/or 4 of the '592 patent (which claim "[a] method for forming a contact to a semiconductor body" using "nitrogen ionized in a plasma" to

create a "first metal nitride layer"; using another process to form a "second metal nitride layer"; and another step involving "depositing a layer of a second metal over said second metal nitride layer"; and more particularly involving the use of "titanium silicide" and "titanium nitride") and the cited VMIC references, which discuss nitrided contacts on semiconductors, are material to those claims and claim limitations.

Finally, AMD makes much of the fact that Samsung did not explicitly allege that the cited references are non-cumulative, but such an allegation is implicit with its allegation of materiality—otherwise the references would not create or establish a question as to the patentability of the '592 patent. *See* Dkt. 273 at 9. AMD's arguments must therefore be rejected.

4. Because Samsung Has Already Alleged John Iacoponi's Intent to Deceive the USPTO, AMD's Motion Must Be Denied.

AMD rehashes old ground by arguing that Samsung has failed to allege John Iacoponi's intent to deceive the patent office. *See* Dkt. 273 at 9-12. Purportedly relying on *Exergen* yet again, AMD merely presents the same arguments that this Court has already rejected and provides no reason for this Court to conclude that the substantive law regarding the pleading of intent has changed.

As AMD must concede, while "a party must state with particularity the circumstances constituting fraud or mistake," the same is *not* true of conditions of a person's mind: "intent . . . may be alleged generally." Fed. R. Civ. P. 9(b). While Samsung must allege at least some facts that will permit a Court to infer wrongful intent, "[d]irect proof of wrongful intent is rarely available but may be inferred from . . . the surrounding circumstances." *LaBounty Mfg., Inc. v. U.S. Int'l Trade Comm'n*, 958 F.2d 1066, 1076 (Fed. Cir. 1992).

Despite AMD's protestations to the contrary, the materiality of the allegedly withheld VMIC references is certainly relevant evidence of Iacoponi's intent to deceive the USPTO. *See Cargill, Inc. v. Canbra Foods, Ltd.*, 476 F.3d 1359, 1367 (Fed. Cir. 2007) ("we have never held that materiality is irrelevant to the question of intent." And: "a high degree of materiality, coupled with evidence that the applicant should have known of that materiality, creates a strong inference of an intent to deceive"). Nor does Samsung merely rely on the alleged materiality of the VMIC references to support its allegations regarding Iacoponi's intent to deceive.

Samsung makes the allegation—one that must be accepted as true for the purposes of this motion—that John Iacoponi "was a co-author of a paper presented at the 1993 VMIC conference," that the paper was entitled "Single Chamber Implementation of a Coherent Ti/TiN Process for Sub-Half Micron Technologies," and that the paper "was included in the materials distributed to participants attending the 1993 VMIC conference." FAAC ¶ 168. This is the foundation for Samsung's further allegations on "information and belief," and these averments hardly strain credulity: John Iacoponi wrote a paper for a major conference that was "well-known to those working in the field of semiconductor interconnect technology" and important enough for Iacoponi to attend on at least 3 separate occasions. FAAC ¶¶ 162, 170. It is not surprising or implausible that Iacoponi read other abstracts and articles—documents surrounding his own article in VMIC materials distributed to conference participants—while contemplating his own paper, of which he certainly had knowledge. FAAC ¶ 163; *see also Semiconductor Energy Lab. Co., Ltd. v. Samsung Elecs. Co., Ltd.*, No. 09-cv-01-bbc, 2010 WL 55847, at *11-12 (W.D. Wis. Jan. 5, 2010) (finding reasonable the inference that named inventor was aware of the material contained in his own patent: "Yamazaki's knowledge of each of these disclosures can be inferred reasonably from the fact that he was a named inventor on the '974 patent."). As alleged, Iacoponi retained VMIC abstracts for "a period of time—typically, at least a year or two" and therefore had ample time to become further acquainted with these material references and appreciate their import. FAAC ¶ 163.[2]

Finally, to the extent that Samsung bases its allegations of intent on the high level of materiality of the withheld references, Samsung's averments are sufficient for the same reasons its allegations of materiality are acceptable.

[2] As in their Opposition to Samsung's Motion to Amend its Answers and Counterclaims, AMD attempts to bring in materials outside the pleadings that are not subject to judicial notice to influence the Court on this motion under Rule 12(c). *See* Dkt. 273 at 10 n.2; Dkt. 201 at 9-10. Such an attempt has already been rejected by this Court, as it noted "[t]he issue of what Mr. Iacoponi knew during the patent prosecution is a question of fact that cannot be resolved on a motion for leave to amend." Dkt. 234 at 5; *see also Synventive Molding Solutions, Inc. v. Husky Injection Molding Sys., Inc.*, No. 2:08-cv-136, 2009 WL 3172740, *3 (D. Vt. Oct. 1, 2009) (rejecting arguments that "attack the merits of [the] inequitable conduct claim" rather than "whether the claim has been adequately pled."). The same is true on a motion for judgment on the pleadings.

C. In the Alternative, Samsung Should Be Granted Leave to Amend.

Although this Court should find that Samsung has sufficiently pleaded its claims and defenses of inequitable conduct in the prosecution of the '592 patent, in the alternative, Samsung requests leave to amend in order to conform its pleadings to any changes required by *Exergen*.

Under the present circumstances, leave to amend is more than justified: it is required. To the extent that *Exergen* modified pleading standards for inequitable conduct—and indeed, AMD repeatedly argues that it made substantial modifications to existing law—Samsung is entitled to a chance to conform to those standards. Otherwise, Samsung would be expected to prophesy forthcoming changes in law and draft its pleadings with an eye toward decisions that have yet to occur.

The Ninth Circuit has recently considered this situation.[3] In *Moss v. U.S. Secret Service*, 572 F.3d 962 (9th Cir. 2009), plaintiffs filed a complaint under the then-prevailing pleading standard of *Conley v. Gibson* 355 U.S. 41 (1957). The Supreme Court then decided *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544 (2007) and *Ashcroft v. Iqbal*, 556 U.S. ---, 129 S.Ct. 1937 (2009), and effected a significant change in pleading standards under Rule 8. Plaintiffs sought leave to amend their complaints to comply with the new cases, and the panel found that "[h]aving initiated the present lawsuit without the benefit of the Court's latest pronouncements on pleadings, Plaintiffs deserve a chance to supplement their complaint with factual content in the manner that *Twombly* and *Iqbal* require." *Moss*, 572 F.3d at 972. Samsung should receive the same chance for identical reasons.

Nor are there any other reasons to deny leave to amend. Leave "shall be freely given when justice so requires." Fed. R. Civ. P. 15(a). This rule is to be "applied with extreme liberality." *Morongo Band of Mission Indians v. Rose*, 893 F.2d 1074, 1079 (9th Cir. 1990). There is no suggestion that Samsung brings its claim for an improper purpose or to delay trial, nor that any

[3] Because the general standards regarding leave to amend are not unique to patent law, the law of the Ninth Circuit governs this question. *See Regents of Univ. of N.M. v. Knight*, 321 F.3d 1111, 1124 (Fed. Cir. 2003) (applying regional circuit law to decision regarding whether to grant leave to amend pleadings).

efforts at amendment are futile or prejudicial. *See Board of Trustees of the Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc.*, No. C05-04158 MHP, 2008 WL 624771 (N.D. Cal. Mar. 4, 2008) (citing *United States v. Webb*, 655 F.2d 977, 980 (9th Cir. 1981)) (listing factors considered when deciding whether to grant leave to amend). Because AMD cannot make such a showing, and because Samsung has already put AMD on notice of its claims, leave to amend should be granted in the interests of justice.

1. Samsung's Proposed Second Amended Answers and Counterclaims Conform With *Exergen* and Adequately Allege the Materiality of the Withheld References, the Claims and Claim Limitations Disclosed in those References, and Explain that the References Are Non-Cumulative.

Samsung's proposed amendments unambiguously comply with *Exergen*. As alleged in the Proposed Second Amended Answers and Counterclaims ("PSAAC") and the Appendix thereto ("PSAAC App."), John Iacoponi withheld VMIC references that bear on all claim limitations disclosed in Claims 1 and 4 of the '592 patent.[4] PSAAC App. ¶¶ 8, 9, 10, 14. The PSAAC identifies the specific page numbers of each VMIC reference that is material to the claims and limitations of the '592 patent, and further identifies the particular reasons why the information on those pages is material and non-cumulative of the art submitted to the USPTO. *Id*. at ¶¶ 1-14. The Court should thus grant leave to amend.

2. The Withheld References Contain Information that Was Not Otherwise Disclosed in the Prior Art of Record for the Iacoponi '592 Patent.

During the prosecution of the '592 patent, John Iacoponi and his attorneys submitted merely a handful of references to the USPTO. Despite the enormous universe of relevant art, Iacoponi apparently concluded that only four United States patents, four Japanese patents, and two articles bore on his purported invention. He did not look far or hard, and there was plenty to find. And indeed, Samsung alleges that Iacoponi did find relevant references that he did not submit to the USPTO: the VMIC articles. *Id*. at ¶¶ 2, 8, 9, 10, 13.

[4] Samsung requests leave to amend the answers and counterclaims of all Samsung defendants. If this Court grants leave, Samsung will file substantially identical amended pleadings for each Samsung defendant.

Despite—or perhaps because of—the scant record provided, the Examiner reviewing the Iacoponi application relied almost entirely on three references: U.S. Patent 4,851,369 ("Ellwanger"), U.S. Patent 5,242,860 ("Nulman"), and Japanese Patent 02-231713 ("Japanese '713" or "Yamazaki"). *Id*. at ¶ 3. But even these sparse references raise questions about the patentability of the '592 patent when combined with the teachings of the withheld VMIC art. And further, many of the VMIC references highlight the precise feature that the Examiner ultimately determined was missing from the cited references: the use of two metal nitride layers. *Id*. at ¶¶ 8, 9.

a. Ellwanger's Teachings

Ellwanger discloses the formation of one titanium nitride layer over titanium silicide; adding another, complementary metallic layer other than titanium nitride; and depositing tungsten on this other metallic layer. *Id*. at ¶ 4. Iacoponi—through his patent prosecutors—explicitly represented to the USPTO that "neither the admitted prior art nor Ellwanger suggests overlaying a first metal nitride layer with a second metal nitride layer." *Id*. Moreover, Iacoponi's prosecutors suggested that "to the contrary, the primary reference, Ellwanger, teaches that titanium nitride is an inferior etch stopper [the purpose served by the complementary metallic layer], and therefore teaches away from" the use of a second titanium nitride layer beneath tungsten, in place of that complementary metallic layer. *Id*. Yet there is a wealth of prior art that teaches the use of or the motivation for using a second titanium nitride layer, and the use of that second titanium nitride layer as an adhesive layer under tungsten,[5] including critical VMIC references.

b. Nulman's Teachings

Nulman teaches the deposition of titanium over a silicon surface; depositing a layer of titanium nitride over the titanium; depositing a second layer of titanium over the titanium nitride; *thereafter* annealing the structure in a nitrogen atmosphere to form titanium silicide on the silicon; and the deposition of aluminum. *Id*. at ¶ 6. Accordingly, Nulman teaches that a silicide should be

[5] Tungsten does not itself adhere well to oxides that surround contact holes. In order for tungsten to "stick" to oxides, a "glue" layer is necessary. Titanium nitride fulfills that role, and is often used to coat oxides and sidewalls in order to ensure that tungsten adheres properly. PSAAC App. ¶ 5.

formed only *after* the deposition of titanium nitride. While Nulman also discloses, in another part of the reference, the deposition of two titanium nitride layers on top of a silicide, Nulman teaches against this use: "One prior art solution to this problem has been to form the titanium silicide barrier layer first and then to sputter additional titanium nitride over the titanium silicide or titanium silicide/titanium nitride layer. . . . while the above method results in satisfactory formation of a titanium silicide contact layer and a titanium nitride barrier layer over the silicide, and beneath the aluminum, an [sic] problem has been encountered involving electromigration of aluminum atoms in the aluminum layer…." *Id*. at ¶ 6. Nulman therefore discourages the deposition of two titanium nitride layers over a silicide, and Nulman does not disclose the use of tungsten at all, let alone the use of titanium nitride films as adhesive layers for tungsten.

c. Yamazaki's Teachings in Japanese '713

Yamazaki teaches depositing titanium onto a silicon surface; heating the titanium in a nitrogen atmosphere at 600ºC for 30 seconds to form a silicide; performing an etch; applying a second heat treatment in nitrogen at 800ºC for 30 seconds; exposing the resulting material to an ammonia plasma to form titanium nitride; and depositing aluminum. *Id*. at ¶ 7. Yamazaki does not disclose the deposition of another titanium nitride layer over the titanium nitride layer formed by the plasma, the use of tungsten, or the use of titanium nitride as an adhesion layer for tungsten. *Id*.

Thus the VMIC references that teach the deposition of two metal nitride layers are material and non-cumulative to the art submitted to the USPTO, especially considering Iacoponi's representation that "neither the admitted prior art nor Ellwanger suggests overlaying a first metal nitride layer with a second metal nitride layer." *Id*. at ¶¶ 4, 8, 9.

d. As Alleged in the PSAAC, John Iacoponi Engaged in Inequitable Conduct by Withholding Material and Non-Cumulative References that Disclose Key Claim Limitations in Claims 1 and 4 of the '592 Patent.

The withheld VMIC references include four general categories of information that—when paired with the prior art submitted to the USPTO—disclose the key limitations of the relevant claims of the '592 patent.

i. Sputtered or Similar Plasma-Enhanced Deposition of Metal Nitrides

The first category of withheld art includes references that disclose the sputtering—or comparable methods of plasma deposition—of metal nitrides on a metal layer or metal silicide layer. These references are not cumulative of Ellwanger because they necessarily disclose the formation of two metal nitride layers, as claimed in the '592 patent ("exposing said metal silicide layer to nitrogen ionized in a plasma, thereby converting a portion of said metal silicide layer to a first metal nitride layer; [and] depositing a layer of a second metal nitride over said metal silicide layer, such that said metal nitride layer overlays and engages said first metal nitride layer…."). Goodman Decl., Ex. 1 at Col. 4 L. 35-39; PSAAC App. ¶ 8. They are also not cumulative of Nulman because most of them involve the sputtering or plasma-enhanced deposition of titanium nitride onto a titanium silicide, and even with respect to those references that do not explicitly state that the metal nitride is sputtered or deposited over a silicide, it would have been obvious to form a silicide before the sputtering or deposition of the nitride. This is because the references do not explictly state, as Nulman does, that the silicide must be formed *after* the nitride deposition. Finally, plasma-enhanced deposition of titanium nitride is different from the mere exposure to an ammonia plasma (with no titanium) that was disclosed in Yamazaki. This art is therefore material and non-cumulative, particularly as Iacoponi and his agents specifically argued during the prosecution of the '592 patent that "neither the admitted prior art nor Ellwanger suggests overlaying a first metal nitride layer with a second metal nitride layer." PSAAC App. ¶ 4.

ii. Use of Tungsten Plugs Over Titanium Nitride Layers

The second category of withheld art includes references that disclose the use of a tungsten plug over titanium nitride without the use of another, complementary metallic layer, such as that used by Ellwanger. These references are material because neither Nulman nor Yamazaki teach the use of tungsten, while Ellwanger teaches away from the use of a titanium nitride layer directly beneath tungsten without the application of the complementary metallic layer. *Id*. at ¶¶ 4, 6, 7. Because, as alleged, tungsten plugs require a layer of titanium nitride to adhere to surfaces such as oxides—while aluminum plugs as disclosed in Nulman and Yamazaki do not—these references suggest the need and motivation for a second titanium nitride layer underneath the tungsten plug.

Id. at ¶ 9. Even if there is already a titanium nitride layer in the bottom of a contact hole, these references provide a reason to use a second metal nitride layer to ensure the adhesion of tungsten to the contact sidewalls and the top of the oxide. *Id*. When combined with Yamazaki, these references provide a motivation for using a first and second metal nitride layer underneath a tungsten layer, rendering claim 1 of the '592 patent obvious.

iii. Conditions for Forming the Silicide that Is Later Exposed to a Nitrogen Plasma

The third category of withheld art includes references that teach the conditions for forming silicides. This is relevant to Claim 1 of the '592 patent, which requires "forming a metal silicide layer" and later exposing that silicide to nitrogen ionized in a plasma. Goodman Decl., Ex. 1 at Col. 4, L. 36-39. References that disclose silicide formation, when paired with references that disclose the formation of two titanium nitride layers by sputtering or plasma-enhanced deposition, as discussed in Section III.C.2.d.i above, render Claims 1 and 4 of the purported invention of the '592 obvious. PSAAC App. ¶ 10.

iv. Use of An Array Of Processes And Materials To Form Layers In Fabricating Contacts in Semiconductors

All the references that Iacoponi allegedly withheld from the USPTO, including those in the categories above, reveal the wide spectrum of processes available for making contacts in semiconductors, using a variety of different chemical substances in a layered structure, and deposited using various different techniques. But because Iacoponi submitted only a handful of references to the USPTO, the range of possible methods appeared far more narrow than it actually was. *Id*. at ¶ 11. Instead of presenting the full menu of options that were known to people working in the area of semiconductor design and fabrication, Iacoponi submitted only a carefully crafted "prix fixe" menu that ultimately misled the Examiner.

The withheld references disclose a variety of processes involved in forming semiconductor contacts. They include thermal and plasma anneals, various types of chemical and physical vapor depositions, rapid thermal processes, and etches. Nor are the materials employed limited: the references discuss the layering of a wide array of metals, most commonly including titanium, titanium nitride, titanium silicide, aluminum, tungsten, cobalt, and related substances. *Id*.

These references collectively teach the layering of an array of materials, in a "mix and match" fashion, using a variety of well-known processes, such that Iacoponi's particular combination of layers and techniques is hardly so remarkable or non-obvious as to merit a patent. Indeed, Iacoponi worked in an extremely crowded field, and in close contact with countless other inventors, scientists, and engineers who periodically gathered to share their knowledge—as they did each year between 1993 and 1996 at the VMIC conferences. *Id*. at ¶ 13. If the VMIC references had been provided to the patent examiner, in light of their sheer volume and variety, the examiner would have concluded that there was both the motivation and the know-how to combine these materials and processes in nearly limitless ways. *Id*. at ¶¶ 12-13. Iacoponi's purported invention is thus just one variation on themes that were obvious to those in the field, and for that reason, the withheld references bear on the validity of claims 1 and 4 of the '592 patent. *Id*. at ¶ 13.

Samsung's PSAAC thus identifies who engaged in inequitable conduct, when the offending conduct took place, names the withheld references, specifies the claims and claim limitations disclosed in the withheld art, notes where the material information can be found in each reference, and explains why this material information was non-cumulative and withheld with an intent to deceive the USPTO. In the end, even where it is not entirely clear whether an applicant should submit a reference to the USPTO, "[c]lose cases should be resolved by disclosure, not unilaterally by the applicant." *LaBounty Mfg., Inc. v. U.S. Int'l Trade Comm'n*, 958 F.2d 1066, 1076 (Fed. Cir. 1992). That is precisely what AMD allegedly failed to do. Samsung should thus be granted leave to amend its answers and counterclaims.

IV. CONCLUSION

Based on the foregoing, Samsung respectfully requests that the Court deny AMD's Motion for Judgment on the Pleadings of No Inequitable Conduct; or in the alternative, grant Samsung leave to amend its pleadings.

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COVINGTON & BURLING LLP

By: */s/ Christine Saunders Haskett*
CHRISTINE SAUNDERS HASKETT

Attorneys for Defendants and Counterclaimants SAMSUNG ELECTRONICS CO., LTD., SAMSUNG SEMICONDUCTOR, INC., SAMSUNG AUSTIN SEMICONDUCTOR, LLC, SAMSUNG ELECTRONICS AMERICA, INC., SAMSUNG TELECOMMUNICATIONS AMERICA, LLC, and SAMSUNG DIGITAL IMAGING CO., LTD.