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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte REINHARD SCHAUER and NORBERT WERNER

Appeal 2017-005206
Application 12/892,201[1]
Technology Center 1700

Before ROMULO H. DELMENDO, KAREN M. HASTINGS, and JAMES C. HOUSEL, *Administrative Patent Judges*.

PER CURIAM.

DECISION ON APPEAL

Appellants seek our review under 35 U.S.C. § 134(a) of the Examiner's decision rejecting claims 29–47.

We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] Appellants identify the real party in interest as Siltronic AG (Appeal Br. 3).

Independent claim 29 is illustrative of the subject matter on appeal (emphases added):

> 29. A device for supporting a semiconductor wafer during the deposition of a layer on a front side of the semiconductor wafer by chemical vapor deposition in a deposition reactor, the semiconductor wafer having a front side, a backside, and an edge, the device comprising:
>
> a susceptor having a continuous top surface extending below the entire backside of the semiconductor wafer, the susceptor being constructed of a porous material
>
> *a wafer support ring having a thermal conductivity of from 5 W/mK to 100 W/mK*, resting directly and firmly on the susceptor such that deposition gas is prevented from passing between the ring and the susceptor into a generally closed space defined by the backside of the wafer, the support ring, and the continuous top surface of the susceptor, the ring further acting as a thermal buffer between the susceptor and a supported semiconductor wafer*, the ring, having a thickness of 0.5-1.5 mm*, positioned between the semiconductor wafer and the susceptor such that the backside of the wafer does not contact the susceptor,
>
> *wherein the ring has a continuous annular recess for receiving the semiconductor wafer*, the recess having an outer diameter and an inner diameter, *the recess having a width of 5 - 15 mm in the direction of its inner diameter, and a depth of from 0.3 mm to 0.7 mm*, the inner diameter being less than the diameter of the semiconductor wafer to be received in the ring and an outer diameter greater than the diameter of the semiconductor wafer.

The Examiner maintains the following rejections:[2]

(a) claims 29–35, 37–39, and 41–47 under 35 U.S.C. § 103(a) as being unpatentable over Sato et al., (US 5,474,612 A, issued Dec. 12, 1995)

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[2] We refer to the Specification, filed Sept. 28, 2010 ("Spec."); Appeal Brief, filed July 15, 2016 ("Appeal Br."); Examiner's Answer, mailed Dec. 21, 2016 ("Ans."); and the Reply Brief, filed Feb. 15, 2017 ("Reply Br.").

("Sato") in view of Moto et al., (US 6,167,194 A, issued Dec. 26, 2000) ("Moto"), Schauer et al., (US 7,101,794 B2, issued Sept. 5, 2006) ("Schauer"), and Yang et al., (US 6,444,027 B1, issued Sept. 3, 2002) ("Yang");

(b) claim 36 under 35 U.S.C. § 103(a) as being unpatentable over Sato, Moto, Schauer, and Yang and further in view of Hwang et al., (US 2006/0004493 A1, published Jan. 5, 2006) ("Hwang");

(c) claim 40 under 35 U.S.C. § 103(a) as being unpatentable over Sato, Moto, Schauer, and Yang and further in view of Ries et al., (US 6,596,095 B2, issued July 22, 2003) ("Ries '095");

(d) claims 29–35, 42, 43, 45, and 46 under 35 U.S.C. § 103(a) as being unpatentable over Ries et al., (US 2001/0037761 A1, published Nov. 8, 2001) ("Ries '761") in view of Moto and Sato; and

(e) claim 36 under 35 U.S.C. § 103(a) as being unpatentable over Ries '761 in view of Moto and Sato and further in view of Hwang.

ANALYSIS

The § 103(a) rejection over Sato, Moto, Schauer, and Yang

Claims 29–35, 37–39, and 41–47 under 35 U.S.C. § 103(a) as being unpatentable over Sato, Moto, Schauer, and Yang. Appellants argue claims 29–35, 37–39, 41, 42, and 44–46 as a first group, claim 43 as a second group, and claim 47 as a third group (Appeal Br. 5–26). We address these groups separately below.

Claims 29–35, 37–39, 41, 42, and 44–46

We select claim 29 as representative. 37 C.F.R. § 41.37(c)(1)(iv).

Appellants contend[3] that the embodiment depicted in Figure 26 of Sato relates to the use of a substrate-supporting member (i.e., second member) that has a low thermal conductivity (e.g., a disc made of glass or ceramic) or has a lower thermal conductivity than a susceptor (i.e., first member) so the substrate-supporting member minimizes heat flow from the susceptor to the periphery of a wafer (Appeal Br. 7–10; Reply Br. 2–5). Appellants assert that some glasses, such as fused silica, have thermal conductivities lower than the range recited in claim 29, Sato teaches away from a wafer support ring having the thermal conductivity recited in claim 29, the Examiner has not properly articulated a reason to change the materials used by Sato, and there is no evidence to support such a conclusion (Appeal Br. 10–11).

Appellants' arguments are unpersuasive. In the rejection of claim 29, the Examiner finds Sato discloses a device for supporting a semiconductor wafer 3, the device including a susceptor 4 and a wafer support ring 10 that includes a continuous annular recess on which the wafer 3 rests, citing Figure 26 of Sato (Ans. 5–6). Sato discloses a holder 4, a substrate supporting member 10 having a stepped portion upon which a substrate 3 is supported, and that "the member **10** is made of glass or ceramics, either being material having low thermal conductivity" (Sato 14:15–28).

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[3] Appellants argue that they discovered an unexpected result and assert that the invention satisfies a long felt need (Appeal Br. 6–7). Appellants do not cite any evidence supporting either assertion, which are made in the context of what appears to be a summary of forthcoming arguments. Therefore, we do not treat these arguments as assertions of secondary indicia of nonobviousness. To the extent such arguments can be treated as assertions of secondary indicia, they are entitled to little weight given the lack of citations to supporting evidence.

Sato's disclosure of "glass or ceramics . . . having low thermal conductivity" encompasses various materials that can be used for the substrate-supporting member. Although Appellants assert some glasses would fall outside the claimed thermal conductivity range recited in claim 29, it is reasonable that some glass or ceramic materials would fall within the range, especially when one considers that thermal conductivity varies with temperature and claim 29 does not specify a temperature for the claimed thermal conductivity range so as to further limit the materials that fall within its scope.

To the extent the Examiner relies upon the embodiment depicted in Figure 14 of Sato, Sato discloses that embodiment includes a block 4 (i.e., susceptor), an annular wall 11, and a substrate-supporting member 10 (Sato 10:13–20). Thus, the embodiment of Figure 14 also provides the structures recited in claim 29. Sato discloses "the substrate-supporting member **10** is made of material having substantially the same heat capacity per unit area as that of the substrate **3**" (*id.* 10:51–54). Although Sato discloses such a member 10 can be made of silicon (*id.* 11:10–15), Moto discloses a guard ring 10 for supporting a semiconductor wafer and that the guard ring 10 can be made of a material having the same specific heat as the semiconductor wafer, such as silicon carbide (Moto 5:38–40, 6:1–5). Therefore, in addition to the discussion above regarding the embodiment of Figure 26 of Sato, the applied references also demonstrate it was known to use a material having the thermal conductivity of claim 29, as well as the specific material recited in dependent claim 30.

Appellants argue that the various embodiments of Sato are separate, unrelated disclosures directed to different solutions and it would not have

been obvious to modify one embodiment, such as the embodiment depicted in Figure 26, in view of another embodiment, such as the embodiment depicted in Figure 14 of Sato (Appeal Br. 7–8, 11; Reply Br. 2–4). However, any combination or substitution of the embodiments of Sato relied upon by the Examiner regards the use of prior art elements (i.e., substrate-supporting members 10) according to their established functions (i.e., to support a semiconductor substrate) (*see KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007)).

In view of the discussion above regarding the embodiments of Figures 26 and 14 of Sato, the disclosure of Yang is not required to demonstrate the use of a material for a substrate-supporting member 10 having the thermal conductivity recited in claim 29. However, to the extent the Examiner relies upon the disclosure of Yang, such as for dependent claim 31, Yang demonstrates it was known to support a semiconductor wafer with a structure made of graphite coated with silicon carbide (Yang 4:38–65, 5:56–61). In other words, although Yang does not disclose the use of a ring separate from a susceptor, Yang demonstrates it was known to support a semiconductor wafer with a material having the thermal conductivity recited in claim 29. Using such a material for the member 10 of Sato would have involved the use of known elements according to their established functions (*KSR*, 550 U.S. at 417). Furthermore, the susceptor of Yang functions as a combined or integral susceptor and ring, as stated by the Examiner (Ans. 48). Sato discloses that such a combined or integral susceptor and ring can be used for its device (Sato 8:26–30, Figure 4) or that separate susceptors and rings can be used (*id.* at Figures 14, 26).

Appellants contend that Schauer teaches away from the susceptor of Yang because its susceptor includes holes that would cause localized temperature differences and that Sato teaches away from the stepped susceptor of Yang and its use of a material that is not a low conductivity material (Appeal Br. 18–20; Reply Br. 7). Further, Appellants assert that Yang does not disclose a support ring as a separate structure from a susceptor (Appeal Br. 19). However, Yang is not cited for its disclosure of a susceptor with holes. Appellants' argument amounts to a bodily incorporation of the structure disclosed by Yang into the device of Sato. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." (*see In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (citations omitted)). As discussed above, the disclosure of Yang demonstrates a structure made of silicon carbide coated graphite can be used to support a semiconductor wafer. With respect to Sato's disclosure of a "low conductivity material," Sato discloses such a material can be a "ceramic" (Sato 14:24–26), which encompasses graphite coated with silicon carbide. Therefore, Appellants' arguments are unpersuasive.

Appellants also argue there is no evidence in the record, other than in Appellants' disclosure, that there was a dislocation problem for reactors having a susceptor that extends below the entirety of a wafer surface and is radiatively heated above and below (Appeal Br. 11). The problem faced by an applicant is a relevant factor to take into consideration in an obviousness determination. However, an invention may be obvious for reasons the

inventor did not contemplate. *See In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990) (en banc) ("In particular, the statement [in *In re Wright*] that a *prima facie* obviousness rejection is not supported if no reference shows or suggests the newly-discovered properties and results of a claimed structure is not the law.") (overruling-in-part *In re Wright*, 848 F.2d 1216 (Fed. Cir. 1988)). Furthermore, "the motivation in the prior art to combine the references does not have to be identical to that of the applicant to establish obviousness." *In re Kemps*, 97 F.3d 1427, 1430 (Fed. Cir. 1996). As we found above, Appellants do not direct us to objective evidence of any secondary considerations, such as unexpected results, in support of nonobviousness. *Dillon*, 919 F.2d at 692 (explaining that where the prior art gives reason or motivation to make the claimed invention, the burden and opportunity to produce evidence such as unexpected results then falls on an applicant to rebut that prima facie case).

With regard to Moto, Appellants argue that the extension 13a of Moto's guard ring is only 2 mm wide and is tapered to minimize a contact surface and heat conduction between the guard ring and the wafer and therefore one of ordinary skill in the art would have lacked a reason to modify a supporting ledge of a wafer support ring to be 5–15 mm wide, as recited in claim 29 (Appeal Br. 14–17; Reply Br. 6–7).

Appellants' arguments are unpersuasive. The Examiner finds that Moto discloses a wafer support ring having a thickness of 0.8 mm, a recess depth of 0.8 mm, and a recess width of 2 mm (Ans. 6). Moto discloses the thickness of the main part 11 of its guard ring 10 is 0.8 mm "and is equal to the thickness of the semiconductor wafer W" (Moto 6:9–11). Moto discloses that the height of the ring recess 12 "is 0.8 mm and is therefore

identical to the thickness of the semiconductor wafer W" (*id.* 6:23–25). Moto further discloses that the substrate bearing part 13 of the ring 10 "has a width of roughly 2 mm and is made annular" (*id.* 6:48–51). Therefore, the disclosure of Moto supports the Examiner's findings.

To the extent the ring dimensions do not fall within the ranges recited in claim 29, the Examiner concludes it would have been obvious to modify the ring dimensions disclosed by Moto to obtain their workable or optimal values (Ans. 6–7). As noted above, Moto discloses that dimensions of its ring are related to dimensions of the wafer it supports. Therefore, it would have been obvious to modify the dimensions of a wafer support ring to determine its workable or optimal dimensions, particularly when the dimensions of a wafer are altered. Furthermore, the relationship between ring dimensions and wafer dimensions demonstrates that the latter is a result-effective variable. "[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980).

As argued by Appellants, Moto discloses that the surface of its substrate bearing part 13 is tapered so there is linear contact between the bearing part and a wafer, which makes heat conduction between the wafer and the ring small (Moto 6:32–41). However, this does not mean that the width of the bearing part is less, which Moto discloses as roughly 2 mm, but only that the bearing part is tapered to minimize contact. Thus, the bearing part may be wider or more narrow but tapered and comply with Moto's teachings about contact area and heat conduction. Moreover, claim 29 recites "wherein the ring has a continuous annular recess *for receiving* the semiconductor wafer" (emphasis added). Even if the ring of Sato were

modified in view of Moto to include a taper to minimize contact, the ring would still be capable of "receiving" a semiconductor wafer, as recited in claim 29. Appellants argue that the ring of Moto has a different function than the ring of Sato because the ring of Moto does not lie on a susceptor (Appeal Br. 14). However, the rings of Sato and Moto both function to support a semiconductor wafer and both rings function to affect the transfer of heat to the wafer (Sato 10:13–22, 11:10–15; Moto 5:38–40, 7:22–30).

Appellants further contend there would have been no reason to modify Sato in view of Moto because Moto discloses an epitaxial process using a top heater and no susceptor but Sato discloses a process using heating from below (Appeal Br. 11–12; Reply Br. 5–7). Appellants further assert that Moto uses an optical pyrometer to detect wafer temperature and control its top heater but this technique cannot be used in Sato, which uses a bottom heater (Appeal Br. 12). In view of these arguments, Appellants contend the Examiner has impermissibly engaged in picking and choosing from the disclosure of Moto to the exclusion of other parts necessary for full appreciation of what a reference suggests to one of ordinary skill in the art and the Examiner has engaged in impermissible hindsight in rejecting Sato in view of Moto and the other applied references (Appeal Br. 12–14; Reply Br. 5–6).

Appellants' arguments are unpersuasive. The disclosure of Sato is not limited to only bottom heating because Sato discloses embodiments including heating above and below a substrate (Sato Figure 39; Ans. 33). Moreover, Appellants' arguments regarding the pyrometer of Moto regard the bodily incorporation of structures disclosed by Moto into Sato's device, not the exclusion of parts necessary for full appreciation of Moto's

disclosure regarding guard ring dimensions for supporting a wafer. As discussed above, the test for obviousness is what the combined teachings of the applied references would have suggested to one of ordinary skill in the art (*In re Keller*, 642 F.2d at 425). Moto's disclosures regarding the dimensions for guard ring are applicable to the member 10 of Sato and its recess, which is used for the same function of supporting a semiconductor wafer. Moreover, Sato discloses various types of heating for processes using its device, including top and bottom heating, and thus Sato appears to permit the type of heating contemplated by Moto.

With regard to Schauer, Appellants assert one of ordinary skill in the art would have lacked a reason to modify Sato, as modified by Moto, in view of Schauer because the porous susceptor of Schauer would have a lower thermal conductivity and would not be useful or effective in the process of Sato, which relies upon bottom heating of its susceptor so heat is conducted through the susceptor and radiated to a wafer (Appeal Br. 17–18).[4] This argument is unpersuasive. As stated by the Examiner (Ans. 47), Appellants do not cite any evidence to support this argument. Further, there is no evidence that Appellants' comparison of glass and fiberglass would

[4] Appellants assert an unexpected result, citing page 8, lines 16–21, of their Specification. However, the cited passage of the Specification only describes an advantage for their invention and does not describe the result as unexpected or provide evidence of any unexpected result. Therefore, we do not treat these arguments as assertions of secondary indicia of nonobviousness. To the extent such arguments can be treated as assertions of secondary indicia, they are entitled to little weight given the lack of citations to supporting evidence. *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) ("[M]ere conclusory statements in the specification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements.").

apply to graphite and result in a lower thermal conductivity by orders of magnitude or a thermal conductivity that would be unsuitable for Sato's process (Appeal Br. 17–18). As the Examiner finds (Ans. 47), Schauer discloses its susceptor can be used in vapor deposition processes (Schauer 1:14–21). Therefore, Schauer would have suggested that its porous susceptor is useful for processes contemplated by Sato.

In addition, Appellants contend "that in many of the embodiments of *Sato*, the space between the wafer and susceptor is not isolated from the reactor interior, *e.g.* is not a 'closed' space" and the posts or other structures of Sato do not prevent deposition gas from passing into a closed space between the backside of a wafer, a support ring, and a top surface of a susceptor, as recited in claim 29 (Appeal Br. 18).

This argument is not persuasive. The Examiner finds that although Sato does not expressly disclose the prevention of gas flow recited in claim 29, Sato, as modified by the applied references, discloses substantially the same structure recited in claim 29 and therefore necessarily performs the recited gas flow prevention function (Ans. 8–9). The structure depicted in Figure 26 supports this finding by showing a cross section of the annular member 10 positioned between the substrate 3 and holder 4. Moreover, Sato discloses "[t]here are no gaps between the substrate **3** and the member **10**, thus not allowing the feed gas flow into the space between the holder **4** and the lower surface of the substrate **3**" with respect to the embodiment of Figure 25 (Sato 14:4–8) and therefore demonstrates gas flow can be prevented with its embodiments. In addition, to the extent Figure 14 is relied upon in the Examiner's rejection, Sato discloses this embodiment

includes an "annular wall **11**," not posts, and Sato discloses that such an annular wall may be substituted for posts (Sato 7:29–36, 10:15–18).

Appellants present new arguments for claims 37 and 38 at page 4 of the Reply Brief. Appellants have not shown good cause why these arguments could not have been presented in the Appeal Brief. Therefore, we will not consider the separate arguments for claims 37 and 38 newly raised in the Reply Brief. 37 C.F.R. § 41.41(b)(2).

As a result, a preponderance of the evidence in the record supports the Examiner's rejection of claim 29. Appellants' arguments do not identify a reversible error in the Examiner's rejection of claim 29. Appellants do not argue claims 30–35, 37–39, 41, 42, and 44–46 separately from claim 29 (Appeal Br. 5–20).

Claim 43

Claim 43 depends from claim 29 and further recites "wherein the wafer support ring has an outer diameter of a few mm greater than an outer diameter of the susceptor."

The Examiner finds Figure 4 of Sato depicts a ring having an outer diameter that is larger than the susceptor portion (Ans. 13). The Examiner concludes it would have been obvious to use the configuration shown in Figure 4 of Sato to modify the embodiment depicted in Figure 26 of Sato as an equivalent means for a susceptor and wafer support ring (*id.*).

Appellants argue that Figure 4 depicts a one piece, integral susceptor in which the lower portion has the same diameter as the upper portion (Appeal Br. 21). However, Figure 4 also depicts portion 11 as having a smaller diameter than that of the holder 4. Thus, Figure 4 supports the Examiner's findings. Moreover, it would have been obvious to modify the

embodiment of Figure 26 in view of the embodiment of Figure 4 as both embodiments are used for the purpose of supporting a semiconductor wafer and thus are equivalents for that purpose. Indeed, Sato discloses that the heat path from the holder 4 to the substrate 3 in Figure 4 permits a "negligibly small" amount of heat to be conducted (Sato 8:32–37), which corresponds with Sato's disclosure regarding the embodiment of Figure 26 (*id.* 14:15–28). As a result, Appellants' arguments are unpersuasive.

Claim 47

Independent claim 47 recites, among other things, a device for supporting a semiconductor wafer, the device comprising a susceptor and a wafer support ring. Claim 47 recites "wherein the device is positioned within an epitaxy chamber having upper heating elements configured to heat a wafer received within the support ring from above, and lower heating elements configured to heat the susceptor from below."

The Examiner finds that claim 47 does not positively recite the chamber or the heating elements referenced in the above quoted language (Ans. 18–19). Appellants assert this language cannot be ignored and claim 47 requires these structures (Appeal Br. 21).

Even assuming Appellants' arguments are correct, Sato discloses its device can be used with a chamber having upper and lower heating elements, as recited in claim 47 (Sato Figure 39). Figure 3 of Yang also demonstrates it was known to use wafer support devices in reactor chambers having upper and lower heaters.

For the reasons discussed above and those set forth in the Examiner's Answer, we sustain the Examiner's § 103(a) rejection of claims 29–35, 37–39, and 41–47 over Sato, Moto, Schauer, and Yang.

The § 103(a) rejection over Sato, Moto, Schauer, Yang, and Hwang

Claim 36 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato, Moto, Schauer, and Yang and further in view of Hwang. Appellants do not present any arguments for this rejection. Therefore, we sustain the Examiner's § 103(a) rejection of claim 36 over Sato, Moto, Schauer, and Yang and Hwang.

The § 103(a) rejection over Sato, Moto, Schauer, Yang, and Ries '095

Claim 40 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato, Moto, Schauer, and Yang and further in view of Ries '095. Claim 40 depends from claim 39, which depends from claim 29, and further recites "the porous susceptor has pores in the form of a multiplicity of small bores spaced apart on the entire continuous top surface of the susceptor which lies below the wafer."

Appellants state that Ries '095 "does indeed (as also does *Yang*), disclose a susceptor with a multiplicity of holes" but it would not have been obvious to modify Sato (as modified by Moto, Schauer, and Yang) in view of Ries '095 because Schauer discloses problems with susceptors having holes (Appeal Br. 22).

Appellants' arguments are unpersuasive. Schauer discloses that susceptors with holes can create an adverse effect on nanotopography of the wafer if the diameter of the holes exceed a certain size (Schauer 1:65–2:4). However, Ries '095 discloses that susceptors with its perforations eliminate halo and reduce nanotopography (Ries '095 17:19–46, 55–58). Thus, Ries '095 addresses the very problems with which Schauer is concerned.

Appellants also argue that Sato teaches away from a stepped integral susceptor because the susceptor causes the wafer to be heated more at its periphery and "[c]onsequently, it is very difficult to form a crystal film having a uniform thickness, on the substrate" (Appeal Br. 19–20, 22 (quoting Sato 1:41–50)). This disclosure of Sato does not teach away from a stepped susceptor but demonstrates it is possible to use one for crystal film growth, even it if "it is very difficult." Something that is known or obvious does not become patentable simply because it has been described as somewhat inferior to some other product for the same use. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994).

For the reasons discussed above and those set forth in the Examiner's Answer, we sustain the Examiner's § 103(a) rejection of claim 40 over Sato, Moto, Schauer, and Yang and Ries '095.

The § 103(a) rejection over Ries '761, Sato, and Moto

Claims 29–35, 42, 43, 45, and 46 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ries '761 in view of Moto and Sato.

Appellants contend that Ries '761 discloses an integral susceptor, not a separate wafer support ring, and that Sato teaches away from such susceptors (Appeal Br. 22–25). As discussed above, Sato's disclosure of difficulties with such susceptors may demonstrate their inferiority but this does not arise to a disclosure that teaches away from their use or that they are incapable of being used in a process for coating a semiconductor wafer supported by the susceptor.

Appellants further argue there would not have been a reason to modify Ries '761 in view of Moto because Moto does not use a susceptor

and Moto is directed to reactors with problems related to top heated reactors (*id.* at 23–24). This argument regards the bodily incorporation of structures disclosed by Moto into the device of Ries '761, not the exclusion of parts necessary for full appreciation of Moto's disclosure regarding guard ring dimensions for supporting a wafer. As discussed above, the test for obviousness is what the combined teachings of the applied references would have suggested to one of ordinary skill in the art. Moto's disclosures regarding the dimensions for guard ring are applicable to the device of Ries '761, which is used for the same function of supporting a semiconductor wafer. Moreover, Figure 4 of Ries '761 includes both top and bottom heating and thus permits the type of heating contemplated by Moto.

Appellants contend there would not have been a reason to modify Ries '761 in view of Sato because Sato is directed to problems related to bottom heated reactors (*id.* at 24–25). This argument is unpersuasive because both references contemplate reactors having top and bottom heating, as demonstrated by Figure 4 of Ries '761 and Figure 39 of Sato.

Appellants further argue there would not have been a reason to use the embodiments of Sato in the device of Ries '761 because Sato is directed to low conductivity materials, "not the high conductivity support ring as claimed by Appellants" (Appeal Br. 24). As discussed above with regard to the rejection of claim 29 over Sato, Moto, Schauer, and Yang, Sato exemplifies various materials that can be used for the substrate-supporting member and it is reasonable that various known glass or ceramic materials would fall within the thermal conductivity range recited in claim 29.

For the reasons discussed above and those set forth in the Examiner's Answer, we sustain the Examiner's § 103(a) rejection of claims 29–35, 42, 43, 45, and 46 over Ries '761, Moto, and Sato.

The § 103(a) rejection over Ries '761, Sato, Moto, and Hwang

Claim 36 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Ries '761 in view of Moto and Sato and further in view of Hwang.

Appellants assert that Hwang, like Moto, is directed to top heating without a susceptor with temperature measurement from below (Appeal Br. 26). As discussed above with regard to the previous rejection and the arguments directed to Moto, this argument regards the bodily incorporation of structures disclosed by Hwang into the device of Ries '761, specifically the top heater and temperature sensor of Hwang, not the exclusion of parts necessary for full appreciation of Hwang's disclosure regarding the dimensions of an edge support 120 that functions to support a wafer (Hwang ¶ 13). Both Ries '761 and Hwang concern structures for supporting a semiconductor wafer and thus one of ordinary skill in the art would have considered Hwang's disclosure of edge support dimensions when considering modifications to the device of Ries '761, particularly when Ries '761 has been modified in view of Sato to use a separate ring to support a wafer.

For these reasons and those set forth in the Examiner's Answer, we sustain the Examiner's § 103(a) rejection of claim 36 over Ries '761, Moto, Sato, and Hwang.

DECISION

The Examiner's rejection of claims 29–47 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED