



Local Division Munich

UPC_CFI_425/2024
UPC_CFI_751/2024

Decision on the merits

**of the Court of First Instance of the Unified Patent Court
Local Division Munich
issued on 28 November 2025**

CLAIMANT

JingAo Solar Co., Ltd., Jinglong Street, Ningjin County, 055550, Xingtai City, Hebei Province, China

hereinafter “the claimant”

represented by: Christopher Maierhöfer

DEFENDANTS

- 1. Chint New Energy Technology Co., Ltd.**, NO.1 Jisheng Road, Jianshan New Zone, 314415, Haining City, Zhejiang Province, China
- 2. Astronergy Europe GmbH**, Stralauer Platz 33-34, 10243, Berlin, Germany
- 3. Astronergy GmbH**, Stralauer Platz 33-34, 10243, Berlin, Germany
- 4. Astronergy Solarmodule GmbH**, Stralauer Platz 33-34, 10243, Berlin, Germany
- 5. Astronergy Solar Netherlands B.V.**, Transformatorweg 38, 1014AK, Amsterdam, Netherlands
- 6. Chint Solar Netherlands B.V.**, Transformatorweg 38, 1014AK, Amsterdam, Netherlands

hereinafter jointly “the defendants”

represented by: Phillip Rektorschek

UPC_CFI_425/2024
UPC_CFI_751/2024

PATENT IN SUIT

European patent n° EP 2 787 541

LANGUAGE OF THE PROCEEDINGS

English

DECIDING JUDGES

This decision was issued by Panel 1 of the Local Division Munich:

Dr. Matthias Zigann, Presiding judge

Tobias Pichlmaier, legally qualified judge (judge-rapporteur)

Petri Rinkinen, legally qualified judge

Giorgio Checcacci, technically qualified judge

ORAL HEARING: 28.10.2025

DECISION: 28.11.2025

Facts and submissions of the parties

The claimant alleges that the defendants have infringed EP 2 787 541. The Patent in Suit was filed by LG Electronics, Inc. on 2 April 2014 under the title

“SOLAR CELL”

The mention of the grant of the Patent in Suit was published on 31 August 2022.

The respective national parts of the Patent in Suit are in force in Germany, France, Italy and the Netherlands, as well as the United Kingdom.

Claim 1 of the Patent in Suit reads:

A solar cell (100) comprising: a monocrystalline silicon substrate (10) having a base area (110) including a first conductive type dopant; an emitter area (20) including a doping area of a second conductive type dopant opposite to the first conductive type dopant formed in a front side of the monocrystalline silicon substrate; a first tunneling layer (44) entirely formed over a back surface of the monocrystalline silicon substrate (10); a back surface field area (30) on the back surface of the monocrystalline silicon substrate (10), wherein the back surface field area (30) comprises a first portion (30a) which is disposed on the first tunneling layer (44); characterized in that the solar cell further comprises a first passivation film (21) formed on the emitter area (20); a second passivation film (31) formed on the back surface field area (30) a first electrode (24) directly connected to the emitter area (20) through a plurality of openings of the first passivation film (21), and a second electrode (34) directly connected to the back surface field area (30) through a plurality of openings of the second passivation film (31), wherein the first portion (30a) of the back surface field area (30) is formed of a polycrystalline silicon doped with the first conductive type dopant.

The claimant is the registered proprietor of the Patent in Suit.

An opposition against the Patent in Suit was filed with the EPO on 31 May 2023. By decision of 2 October 2024, claim 13 of the Patent in suit was amended. Apart from that, the Opposition Division upheld the patent as granted (defendant’s Exhibit TW

16). Appeal proceedings are pending. A provisional opinion of the Board of Appeal dated 23 October 2025 has been submitted by the claimant as Exhibit K 43.

The defendants are members of a Chinese group of companies and offer solar cells and modules. Defendant 1) is the parent company of the Astronergy group. Defendants 2) – 4) are German affiliates of Defendant 1). Defendants 5) and 6) are Dutch affiliates.

The defendants offer solar modules of the “ASTRO N” series in various countries throughout the European Union, including in Germany, France, Italy and the Netherlands. Solar modules of the series “ASTRO N” are so-called n-type TOPCon solar cells. A description of these modules and their technical specifications can be found in the ‘White Paper’ submitted as Exhibit K 13.

The claimant alleges that defendant’s solar modules of the “ASTRO N” series infringe the Patent in Suit.

The defendants assert a lack of standing to sue and incomplete infringement allegations. They dispute patent infringement and also the validity of the Patent in Suit. Furthermore, defendants allege a violation of antitrust law by the claimant in this context.

Requests regarding the infringement action

In its Reply to the Statement of defence, the claimant requested to change its set of requests set forth in the Statement of claim, because

- a new version of the Infringing Embodiment (“ASTRO N8 Bifacial Series”) has been placed on the market after the filing of the Statement of claim,
- claim 13 of the Patent in Suit was amended by the decision of the Opposition Division in the EPO opposition proceedings, and
- the auxiliary requests in the filing of an application to amend the Patent in Suit under R. 30 RoP in response to defendants’ Counterclaim for revocation include features of subclaims 2, 3, 4, 9 and 10 (these subclaims were not the subject of the Statement of claim) as granted.

The court granted this application for leave to change claim by order dated 31 March 2025. Reference is made to this order. Changes compared to the set of requests in the Statement of claim are highlighted below by underlining.

The claimant requests that the Court

- I. order Defendants to refrain from making, offering, placing on the market, using or importing or storing for those purposes within the territory of Germany, France, Italy and the Netherlands,

a solar cell (100) comprising: a monocrystalline silicon substrate (10) having a base area (110) including a first conductive type dopant; an emitter area (20) including a doping area of a second conductive type dopant opposite to the first conductive type dopant formed in a front side of the monocrystalline silicon substrate; a first tunneling layer (44) entirely formed over a back surface of the monocrystalline silicon substrate (10); a back surface field area (30) on the back surface of the monocrystalline silicon substrate (10), wherein the back surface field area (30) comprises a first portion (30a) which is disposed on the first tunneling layer (44); characterized in that the solar cell further comprises a first passivation film (21) formed on the emitter area (20); a second passivation film (31) formed on the back surface field area (30), a first electrode (24) directly connected to the emitter area (20) through a plurality of openings of the first

passivation film (21), and a second electrode (34) directly connected to the back surface field area (30) through a plurality of openings of the second passivation film (31), wherein the first portion (30a) of the back surface field area (30) is formed of a polycrystalline silicon doped with the first conductive type dopant.

(independent claim 1 of the Patent in Suit)

in particular when

the back surface field area (30) further comprises a second portion (30b) which is disposed in a portion of the monocrystalline silicon substrate (10) adjacent to the first tunneling layer (44) and is doped with the first conductive type dopant

(dependent claim 2 of the Patent in Suit)

and/or

a doping concentration of the first portion (30a) of the back surface field area (30) is higher than a doping concentration of the second portion (30b) and the second portion (30b) has the same crystal structure as the monocrystalline silicon substrate

(dependent claim 3 of the Patent in Suit)

and/or

a thickness of the first portion (30a) of the back surface field area (30) is 50 nm to 500 nm, and a thickness of the second portion (30b) of the back surface field area (30) is 5 nm to 100 nm

(dependent claim 4 of the Patent in Suit)

and/or

the solar cell (100) according to any of the preceding claims is characterized by further comprising a first anti-reflective film (22) on the first passivation film (21)

(dependent claim 5 of the Patent in Suit)

and/or

the solar cell (100) according to any of the preceding claims is characterized by further comprising a second anti-reflective film (32) on the second passivation film (31)

(dependent claim 6 of the Patent in Suit)

and/or

the solar cell (100) according to any of the preceding claims is characterized in that the first tunneling layer (44) has a thickness of 0.5 nm to 5 nm

(dependent claim 7 of the Patent in Suit)

and/or

a doping concentration of an area of the first portion (30a) of the back surface field area (30) adjacent to the first electrode (24) is higher than a doping concentration of an area of the first portion (30a) of the back surface field area (30) adjacent to the first tunneling layer (42)

(dependent claim 9 of the Patent in Suit)

and/or

the first portion (30a) and the second portion (30b) of the back surface field area (30) have a same dopant

(dependent claim 10 of the Patent in Suit)

and/or

the emitter area (20) includes a first region (201) having a high dopant concentration and a second region (202) having a lower dopant concentration than the first region (201), wherein the first region (201) contacts at least a part of the first electrode (24) and the second region (202) is formed in a region of the emitter area (20) between the first electrode (24) directly connected to the emitter area (20) through the plurality of openings of the first passivation film (21)

(dependent claim 12 of the Patent in Suit)

and/or

the first and second electrodes (24, 34) include a plurality of finger electrodes (24a, 34a) having a first pitch (P1) and being disposed in parallel to each other and bus bar electrodes (24b, 34b) formed in a direction crossing the finger electrodes (24a, 34a)

(dependent claim 13 of the Patent in Suit)

and/or

the emitter area (20) has a p-type conductivity, and the first passivation film (21) includes at least one of aluminum oxide, zirconium oxide, and hafnium oxide having a negative charge

(dependent claim 14 of the Patent in Suit)

and/or

the back surface field area (3) has an n-type conductivity, and the second passivation film (31) includes at least one of silicon oxide and silicon nitride having a positive charge

(dependent claim 15 of the Patent in Suit)

in particular

solar cell modules of the “Astro N-Series”, especially:

- ASTRO N5 Bifacial Series
- ASTRO N5 Monofacial Series
- ASTRO N5s Monofacial Series
- ASTRO N7 Bifacial Series
- ASTRO N7s Bifacial Series
- ASTRO N8 Bifacial Series.

- II. order Defendants for each case of violation of the order according to item I. to make penalty payments to the Court, which are to be determined by the Court in reasonable proportion to the importance of the order to be enforced, whereby an amount of EUR 20,000 for each case of non-compliance and per item is suggested;
- III. find that the Patent in Suit was infringed by Defendants in respect to the products described above under item I.;
- IV. order Defendants, under penalty of a periodic fine of EUR 1,000 for each day of delay, within a period of three weeks from the date of service of the decision, to

provide claimant with information on the extent to which Defendants have committed the acts referred to in item I. since 31 August 2022, specifying:

1. the origin and distribution channels of the infringing products,
 2. the quantities produced, manufactured, delivered, received or ordered, as well as the prices paid for the infringing products, and
 3. the identity of any third person involved in the manufacture or distribution of infringing products;
- V. order Defendants, under penalty of a recurring fine of EUR 1,000 for each day of delay, within a period of one week from the date of service of the decision, to recall from the commercial customers the products described above under item I. that have been placed on the market since 31 August 2022, with reference to the infringement of the products determined by the Court and with the binding promise to pay any fees and necessary packaging and transport costs, as well as customs and storage costs associated with the return, and to take back the products to have them finally removed from the distribution channels;
- VI. order Defendants, under penalty of a recurring fine of EUR 1,000 for each day of delay, within a period of one week from the date of service of the decision, to destroy the products referred to above in item I. and/or materials in their direct and/or indirect possession and/or ownership (including any products and/or materials that come into their direct and/or indirect possession and/or ownership pursuant to item IV. above or otherwise) or, at their option, to hand them over to a bailiff to be appointed or commissioned by claimant for the purpose of destruction;
- VII. find that Defendants are obligated to reimburse claimant for any damages incurred by claimant since 31 August 2022 due to the actions described above under item I. as well as those yet to be incurred, including interest;
- VIII. order Defendants to pay preliminary damages, with the amount of the security at the discretion of the Court, where at a minimum claimant's projected costs of

the damages and compensation proceedings must be covered and an amount of at least EUR 224,000.00 is suggested;

- IX. allow claimant to publish the Court's decision in whole or in part, including the announcement of the decision, on its website and public media, including industrial journals of its choice;
- X. order Defendants to publish the operative part of the Court's decision on their websites;
- XI. order Defendants to pay the costs of the proceedings, including those relating to the measures requested in items I. to VIII. above and the Counterclaim for revocation;
- XII. attach to the decision an order for its immediate enforceability

alternatively,

in the event a security is ordered, permit claimant to provide it by bank or savings institution guarantee and determine the amount of the security separately for each claim awarded and for the decision of costs,

alternatively,

permit claimant to avoid compulsory enforcement with respect to the costs against provision of security;
- XIII. issue a decision by default in the event that Defendants fail to take action within the time limit foreseen in these Rules of Procedure or set by the Court or fail to appear at an oral hearing after having been duly summoned.

Defendants' request:

- I. The action is dismissed.
- II. Claimant bears the costs of the proceedings including adequate reimbursement of the Defendants' costs.

In the alternative in case the Court should order an injunction, information, destruction and/or recall and removal:

- III. The Defendants are granted a grace period of 18 months after the announcement of the decision, before an injunction, destruction and/or recall and removal are enforced.
- IV. The enforcement of any injunction, destruction or recall and removal is conditional upon a financial security provided by the Claimant in the amount of EUR ten (10) million.
- V. An order against the Defendants to provide information under motion IV of the Complaint is made conditional upon a confidentiality order against the Claimant to the effect that (a) the access to the information is restricted to Claimant's outside counsels and two representatives of Claimant who are named to the Defendants in advance and (b) the information may be used only for the purposes of calculating potential damage and compensation claims against the Defendants and for identifying other parties involved in the supply or distribution of the accused products for the purpose of asserting claims for alleged patent infringement against them.

Requests regarding the Counterclaim for revocation

Defendants' request:

- I. EP 2 787 541 is revoked in its entirety for all Contracting Member States in which EP 2 787 541 has effect.
- II. The Court sends a copy of the decision to the European Patent Office and to the national patent office of any Contracting Member State concerned in accordance with UPCA, Article 65(5).
- III. Claimant bears the costs of the Counterclaim for revocation including adequate reimbursement of the Defendants' costs.

Claimant requests:

1. The Defendants' Counterclaim for revocation be dismissed in its entirety.

In the alternative:

The Patent in Suit be maintained based on one of the Auxiliary Requests 1 – 14 filed with the Application to amend the patent;

further in the alternative:

To the extent not reflected in one of the Auxiliary Requests 1 – 14, the Patent in Suit be maintained based on the independent validity of one or more of its dependent claims in combination with independent claim 1;

2. The Defendants bear the costs for the Counterclaim for revocation.

Defendants' request with regard to the Auxiliary requests 1 – 14:

The request to revoke EP 2 787 541 in its entirety for all Contracting Member States shall apply – for the sake of clarity – also for all auxiliary requests and dependent claims as (further) submitted by the Claimant with its Reply to the Counterclaim for Revocation and its Application to Amend the Patent.

With regard to validity objections from the Reply to the defence to the Counterclaim for revocation, **claimant requests,**

- I. not to admit the following validity objections in these proceedings:
 1. "D6 renders Patent obvious in view of D28" (Rp-CfR at paras. 75 to 90);
 2. "D33 renders Patent obvious in view of D28" (Rp-CfR at paras. 91 to 97);
 3. "D31 renders Patent obvious in view of D28" (Rp-CfR at paras. 98 to 104);
and
 4. "Obviousness starting from D8" (Rp-CfR at paras. 105 to 131);
- II. not to admit prior art documents Exhibit D33 (US 2013 042 913 A1) and Exhibit D34 (US 2011 272 012 A1) in these proceedings.
- III. that the unnecessary costs caused to the Claimant by the substantive defence against the inadmissible attacks shall be borne by the Defendants in any event, in accordance with the principle laid out in section (1) of the "Decision of the administrative committee of 24 April 2023 on the scale of recoverable cost ceilings" (hereinafter "DoRCC"). In the event of the Claimant's success, this includes a request to raise the ceilings laid down in the Annex of the DoRCC pursuant to Article 2 (1) DoRCC.

Defendants request,

to dismiss these requests.

Requests regarding the defendants allegation of the claimant's market abuse

Defendants' request:

An Order to produce evidence, namely for the Claimant to produce complete copies of transfer / purchase agreements as well as potential license agreements regarding the Patent in Suit, between the Claimant and/or its group companies, any Jinko-Group companies and/or any Trina-Group companies as well as potential side letters to such agreements, negotiation meeting protocols, emails exchanged in context to the negotiations of such agreements, within a period of one month.

As auxiliary request:

The beforementioned Order to produce complete copies of said evidence under a respective confidentiality order.

As auxiliary request:

The beforementioned Order/s to produce complete copies of said evidence includes the provision that the evidence be disclosed to certain named persons only and be subject to appropriate terms of non-disclosure.

Claimant requests,

to dismiss the request to produce evidence.

Grounds for the decision

The infringement action is admissible and predominantly well-founded. The Counterclaim for revocation is unfounded.

I. Claimant's standing to sue

The claimant is the patent proprietor and thus entitled to bring actions before the Court.

The claimant acquired the Patent in Suit from Shangrao Jinko Solar Technology Development Co., Ltd. ("Jinko") who previously acquired the Patent in Suit from the original proprietor LG Electronics, Inc. ("LG"). The respective documentation of the alleged acquisitions sufficiently substantiate a successful transfer of the Patent in Suit to the claimant.

Both the first transfer from LG to Jinko (Exhibit TW 1; dated 21 September 2022)

Unterschrift:
Signature:

Xiande Li

and the second transfer from Jinko to the claimant (two agreements in the EPO register titled "Confirmatory Assignment of Patent Rights", submitted as Exhibit TW 2a and 2b; dated 16 May 2024)

Xiande Li
(Assignor's signature)

Xiande Li
(Assignor's signature)

show the signature of *Xiande Li* on behalf of Jinko.

As far as defendants with regard to a lack of similarity of the signatures consider it questionable whether it was the same person who signed the agreements, the panel cannot infer from this that there is a lack of standing to sue.

First of all, it should be noted that in any case no handwritten signature completely corresponds to another signature of the same individual (in case of an identical signature, it would most probably be forging of a signature).

Furthermore, there is a considerable period of time between the date of signing of the different documents. Apart from that, what can be seen on the documents are characters different from the characters that the person signing presumably uses: the person in question is a Chinese citizen and therefore reasonably is used to sign with Chinese characters and not with Latin characters. Therefore, the differences visible are to be attributed to mere writing difficulties.

Defendants' statement of defence also provides no indication that the person signing was not authorized to sign the agreements.

II. Sufficient allegation and substantiation of the infringement action

According to Rule 13.1 (l) RoP claimant must lodge a Statement of claim which contains

“... an indication of the facts relied on, in particular:

(i) one or more instances of alleged infringements or threatened infringements specifying the date and place of each; ...”

According to Rule 13.1 (n) RoP claimant must lodge a Statement of claim which contains

“...the reasons why the facts relied on constitute an infringement of the patent claims, including arguments of law and where appropriate an explanation of the proposed claim interpretation;”

The defendants are of the opinion that the Statement of claim lacks a detailed outline of the infringement and a mapping of the features of the patent claims with the features of the accused devices and hence the infringement action is inadmissible. Defendants in this context criticise that claimant merely addressed *one* product as example (“ASTRO N5” with the specific designation “Astronergy N-type PV module CHSM54N-HC BF 430Wp), which in view of defendants cannot be applied to the further accused products.

In the Statement of claim, claimant provided extensive explanations with regard to claim construction. Such explanations, if they can be considered mandatory at all (“where appropriate an explanation of the proposed claim interpretation...”),

need not be complete or correct in order for the Statement of claim to be admissible.

Furthermore, claimant provided a detailed infringement mapping for each feature of claim 1 as well as the asserted sub-claims, with particular reference to the Test Report (Exhibit K 16) and the “Astro N Product White Paper” (Exhibit K 13), which describes the functioning and structure of all TOPCon solar cells of Defendants’ “N Series”. If, according to claimant's submission, all contested embodiments are identical in construction in the relevant features, a uniform presentation for all products of this series is sufficiently substantiated. It was not necessary to carry out tests for each individual product type in this series.

In view of the above, the infringement action is admissible with regard to the infringement submission and the explanations on claim interpretation.

III. Person skilled in the art

In order to assess the legal situation in the present case, it is first necessary to determine the person skilled in the relevant art. The person skilled in the art has a university degree in semiconductor physics and has several years of experience in the field of solar cell design and manufacturing. The skilled person is aware of the existing approaches, trends and scientific developments regarding solar cell structure and manufacturing. This description of the relevant expertise is correct and not in dispute between the parties.

IV. Subject matter of the Patent in Suit

The Patent in Suit relates to a solar cell, including a semiconductor substrate and a method for fabricating a solar cell.

Such a solar cell may be manufactured by forming conductive type areas and electrodes electrically connected thereto on a semiconductor substrate in order to cause photoelectric conversion (see para. [0003]). At the time of the application of the Patent in Suit, a broad number of measures were available to improve solar cells.

Within para. [0005] the description of the Patent in Suit explains that the efficiency of conventional solar cells may be deteriorated due to recombination of carriers on the semiconductor substrate, long transfer distances of the carriers, and the like. Based on this, the Patent in Suit defines the problem to be solved as providing a solar cell which is capable of maximizing efficiency and providing a method of fabricating such solar cell (see para. [0006]).

1. Patent claim 1

In order to achieve this objective, the Patent in Suit proposes a solar cell comprising the following features according to claim 1 (with the numbering of the features presented by the parties and added here by the Local Division):

A solar cell (100) comprising:

- 1 a monocrystalline silicon substrate (10)
 - 1.1 having a base area (110)
 - 1.2 including a first conductive type dopant
- 2 an emitter area (20)
 - 2.1 including a doping area of a second conductive type dopant opposite to the first conductive type dopant
 - 2.2 formed in a front side of the monocrystalline silicon substrate
- 3 a first tunneling layer (44) entirely formed over a back surface of the monocrystalline silicon substrate (10)
- 4 a back surface field area (30) on the back surface of the monocrystalline silicon substrate (10), wherein the back surface field area (30) comprises a first portion (30a) which is disposed on the first tunneling layer (44)

characterized in that

- 5 the solar cell further comprises a first passivation film (21) formed on the emitter area (20);
- 6 a second passivation film (31) formed on the back surface field area (30)
- 7 a first electrode (24) directly connected to the emitter area (20) through a plurality of openings of the first passivation film (21),

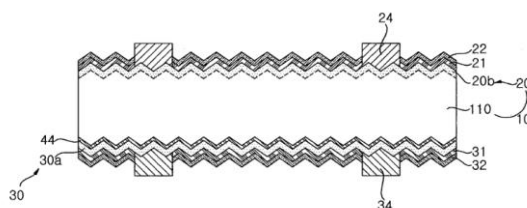
- 8 a second electrode (34) directly connected to the back surface field area (30) through a plurality of openings of the second passivation film (31),
- 9 wherein the first portion (30a) of the back surface field area (30)
 - 9.1 is formed of a polycrystalline silicon
 - 9.2 is doped with the first conductive type dopant.

2. Claim construction

a. Basic parts of the solar cell according to patent claim 1

With patent claim 1 a solar cell comprising a monocrystalline silicon substrate (10), conductive type areas (emitter area 20 and back surface field area 30), a first (21) and second passivation film (31), a first (24) and a second (34) electrode and at least one tunneling layer (44) is proposed:

FIG. 8

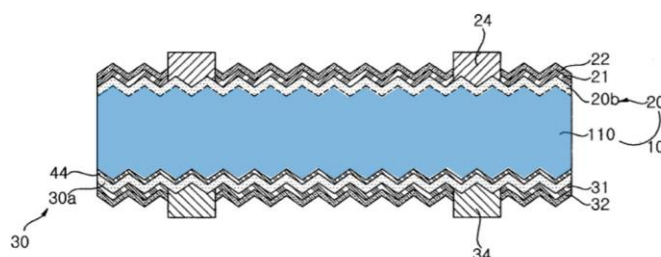


b. Technical specifications of the solar cell according to patent claim 1

This general structure roughly described under IV. 2. a. is further specified in claim 1 as follows:

aa. monocrystalline silicon substrate (feature 1)

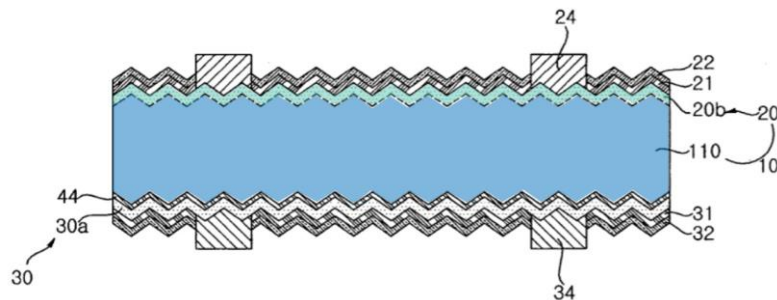
The monocrystalline silicon substrate (10; below coloured in blue) is made from a *single* continuous crystal structure (“mono”).



Monocrystalline silicon substrates in comparison to polycrystalline structures exhibit superior electrical properties since they have little defects due to superior crystallinity (see para. [0020]). The substrate (10) includes a base area (110) containing a first conductive type dopant. The patent description discloses that the dopant may be either an n-type or p-type dopant (see para. [0021]).

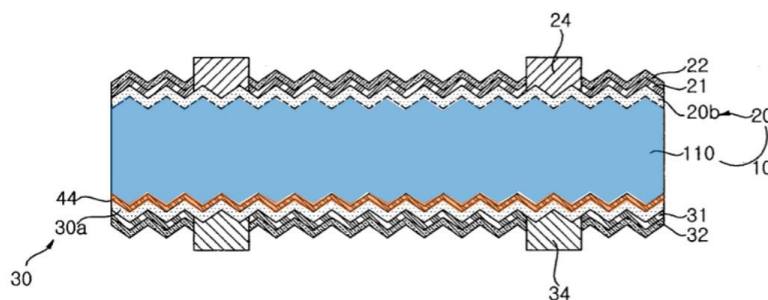
bb. Emitter area (feature 2)

The emitter area (20; below marked in light green) includes a doping area of a second conductive type dopant opposite to the first conductive type dopant and is formed in a front side of the monocrystalline silicon substrate. The second conductive type dopant can be a p-type or n-type impurity, depending on the type of doping of the base area. The difference in conductive type dopant creates a pn junction between the emitter area and the base area (see para. [0022], [0098]). This feature does not claim a specific second conductive type dopant. It only requires the emitter to include any second conductive type dopant.



cc. Tunneling layer (feature 3)

The first tunneling layer (44; below marked in red) is *entirely formed over* a back surface of the monocrystalline silicon substrate (10).



This feature requires further explanation:

(1.) [Quantum mechanical tunneling effect](#)

According to the Claimant's interpretation the tunneling layer "provides a potential barrier allowing a quantum mechanical tunneling effect within the claimed solar cell through which (at least some of) the separated charge carriers (electrons or holes) can tunnel on their way to their respective contact".

A tunneling effect is mentioned several times in the description (para. [0028], [0029], [0030], [0039], [0040], [0041]). According to the patent description, the tunneling effect may be achieved by including, for example, oxide, nitride, a semiconductor, a conductive polymer or the like, in the tunneling layer (44), thereby consisting of (for example) silicon oxide, silicon nitride, silicon oxide nitride or intrinsic amorphous silicon (see para. [0040]). The person skilled in the art has been familiar with this effect at the priority date.

(2.) [Layer entirely formed over the back surface of the semiconductor substrate](#)

The tunneling layer is formed over the back surface of the semiconductor substrate, thereby entirely removing defects on the back surface of the semiconductor substrate. As a result, open circuit voltage of the solar cell is improved and efficiency of the solar cell is thus enhanced (see para. [0042]).

According to para. [0038], the expression "*entirely formed*" means that an element such as a layer is formed over an entire surface without an empty area or a non-coverage area, or is formed over an entire area excluding pre-designated or inevitably formed regions such as periphery region, isolation region or the like.

In the opinion of defendants this claim wording requires that the underlying back surface of the substrate is fully covered by the tunneling layer without openings. The defendants refer in this regard to para. [0042] and [0096], which reads:

"As used herein, the expression 'entirely formed' means that the first portion 20a or the second portion 20b is formed over 100% of the front surface, or an area in which the first portion 20a or the second portion 20b is not formed is inevitably disposed in a part of the surface."

Further, according to the defendants, the claim language explicitly distinguishes between layers “entirely formed over” (feature 3) and, for example, layers “formed in” (feature 2.2) and “disposed on” (feature 2). This explicit distinction of the claim indicates that these do not have the same technical meaning. Particularly, a layer formed “over” cannot be the same as a layer formed “in” another element. This is supported by the description, particularly para. [0127] of the Patent in Suit. The methods for forming a tunneling layer described therein relate to known methods of deposition (e.g., atomic layer deposition) of layers on top of a substrate or another layer. Therefore, a tunneling layer is not “formed over” a back surface of a substrate if it is formed in the substrate.

In the opinion of the Court, from a technical and functional point of view the tunneling layer is entirely formed over the surface in order to ensure the tunneling effect over the entire surface. As long as this effect can be assumed to exist across the entire surface, it is irrelevant whether there are small holes (pinholes) on the surface that are unavoidable in production as the claimant has argued.

This is supported by para. [0038] of the Patent in Suit, which states that the expression “entirely formed” means that an element such as a layer is formed over an entire area excluding pre-designated or inevitably formed regions such as periphery region, isolation region or the like. This means that neither the regions referred to in para. [0038] nor pinholes prevent a tunnelling effect.

The defendant's expert has made the following statement which supports the Court's understanding with regard to such openings:

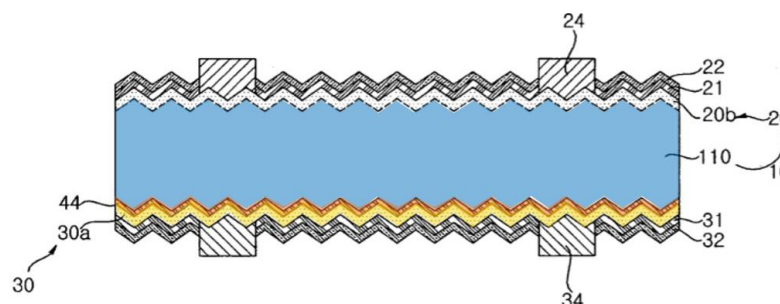
“Such openings (pinholes, or of larger areas) in the silicon oxide layer lead to direct semiconductor-semiconductor contact between the polycrystalline silicon layer and the monocrystalline silicon wafer. The charge carriers then flow directly in the energy bands of the silicon (valence band, conduction band) via the contact surface. In areas where silicon dioxide is located between the polycrystalline silicon layer and the wafer, any charge transport across the contact surface depends on the properties of the oxide: The silicon oxide can either act as an insulator, preventing charge carriers from flowing, or as a so called tunnel barrier, through which the charge transport process takes place in a quantum mechanical tunnel process. **The larger**

the openings in the silicon oxide and the more openings there are, the more eventual charge transport via the tunnel effect recedes into the background.”

It can be deduced from the expert opinion that tunneling effect takes place even when there may be openings and hence direct contact between the polycrystalline silicon layer and the monocrystalline silicon wafer.

dd. Back surface field area (feature 4)

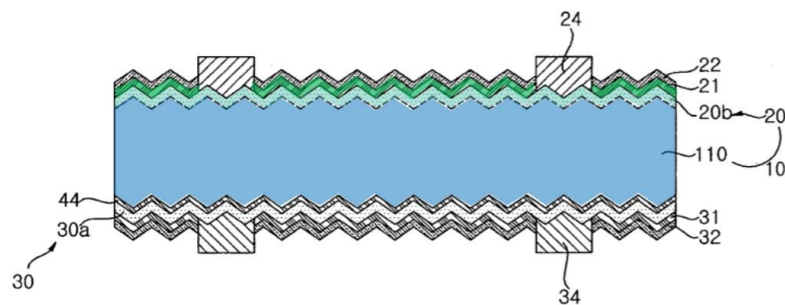
According to claim 1, a back surface field area (30; below highlighted in yellow) on the back surface of the monocrystalline silicon substrate comprises a first portion (30a) which is disposed on the first tunneling layer (44; highlighted in red). The first portion (30a) of the back surface field area (30) is formed of a polycrystalline silicon and doped with the first conductive type dopant.



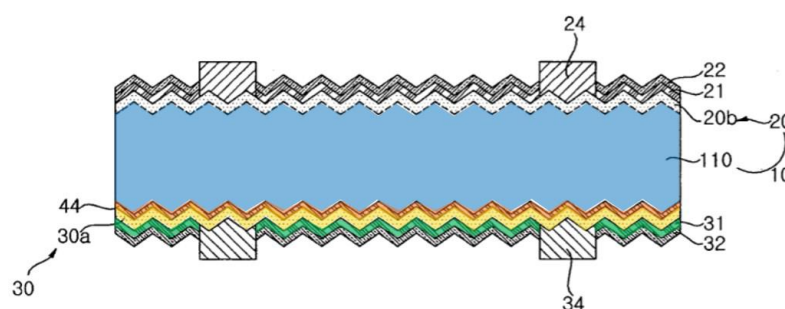
This feature discloses the location of another layer on the back surface of the solar cell. According to the patent description the back surface field area is formed of a polycrystalline silicon because this structure can be easily manufactured (see para. [0043]). The requirement to be doped with the first conductive type dopant means that it has the same conductivity type as that of the semiconductor substrate of the base area (see para. [0043]).

ee. Passivation films (features 5 and 6)

According to claim 1 (features 5 and 6), a first passivation film (21; highlighted in dark green) is formed on the emitter area (20; highlighted in light green)



and a second passivation film (31; highlighted in dark green) is formed on the back surface field area (30; highlighted in yellow):

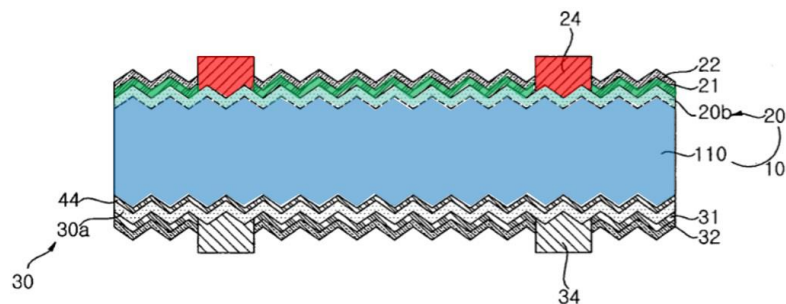


Both passivation films are designed to passivate defects in the area next to them, thereby removing recombination sites of minority carriers, and increasing the open circuit voltage of the solar cell (see para. [0034], [0046]). The material of both passivation films can include silicon nitride, silicon nitride containing hydrogen, silicon oxide, silicon oxide nitride, aluminum oxide, zirconium oxide, hafnium oxide, MgF₂, ZnS, TiO₂, or CeO₂ and can be a single film or a multilayer film including a combination of these materials (see para. [0035], [0047]).

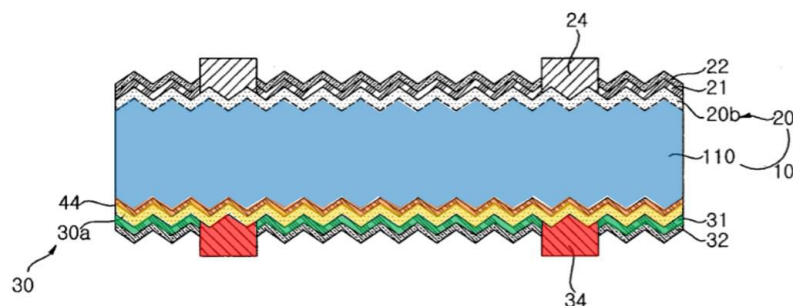
The passivation is selected based on the type of area next to it: when the emitter area or back surface field area is n-type, materials with a positive charge like silicon oxide or silicon nitride are preferred, whereas when next to p-type areas, materials with a negative charge like aluminum oxide, zirconium oxide, or hafnium oxide or the like might be used (see para. [0035], [0047]).

ff. Electrodes (features 7 and 8)

Finally, the claim requires the presence of a first electrode (24; highlighted in red) directly connected to the emitter area (20) through a plurality of openings of the first passivation film (21)



and a second electrode (34; highlighted in red) directly connected to the back surface field area (30) through a plurality of openings of the second passivation film (31):



Both electrodes may have various shapes and can be made from highly conductive materials such as metals. They can be formed using methods like coating, deposition, or printing (see para. [0053]). The electrodes may consist of finger electrodes (24a) and bus bar electrodes (24b). Finger electrodes are typically arranged in parallel and connected by bus bar electrodes. The bus bar electrodes can have a larger width compared to the finger electrodes (see para. [0051]).

With the Opposition Division (Exhibit TW 16, page 11/12), the Court is of the opinion that "directly connected to" is meant in the sense that there is no intermediate material between the electrode and the "emitter area" and the "back surface field area" respectively.

V. Validity of the Patent in Suit (independent claims)

The defendants base their Counterclaim for revocation on lack of novelty, lack of inventive step, lack of enabling disclosure and extended subject-matter.

1. Extended subject-matter

Under Art. 138(1)(c) EPC a European patent may be revoked if its subject-matter extends beyond the content of the application as filed or, if it was granted on a divisional application, extends beyond the content of the earlier application as filed.

In order to ascertain whether there is added matter contrary to Art. 123(2) EPC, the Court must thus first ascertain what the skilled person would derive directly and unambiguously using his common general knowledge and seen objectively and relative to the date of filing, from the whole of the application as filed, whereby implicitly disclosed subject-matter, i.e. matter that is a clear and unambiguous consequence of what is explicitly mentioned, shall also be considered as part of its content (UPC_CoA_382/2024, order of 14 February 2025, Abbott v Sibio, para. 52; UPC_CoA_528/2024, decision of 25 November 2025, Amgen v Sanofi, para. 53).

The underlying rationale for this requirement is that the patentee cannot claim more than he actually contributed to the state of the art at the priority date. Therefore, an amendment that is made after the priority date should not provide the skilled person with additional technically relevant information which was not derivable from the original application (UPC_CoA_528/2024, decision of 25 November 2025, Amgen v Sanofi, para. 55).

a. Monocrystalline silicon substrate

Defendants argue that the application as filed (EP 2 787 541 A1; Exhibit TW 25) does allow other regions than the base area to have a different crystallinity, for example to be polycrystalline. Based on this there would be no disclosure in the application as filed that does require the entire substrate to be monocrystalline.

Throughout the application as filed, it is only the base area that is described to be of a monocrystalline silicon.

This argument is not convincing. If a part of a substrate has a certain crystallinity, all parts of that substrate can only have the same crystallinity otherwise they would not be part of the same substrate. According to the application as filed also the emitter area, which is formed in the semiconductor substrate, has the same monocrystalline silicon structure as the base area (para. [0079]). The skilled person interprets the disclosure of the original application such that the substrate as a whole is composed of a monocrystalline wafer which is divided into regions (second portions, base area) according to a particular doping (provisional opinion of the EPO Board of Appeal, Exhibit K 43).

b. Undoped base area

Defendants argue that even though it is disclosed in the application as filed that the base area may be doped with a first type dopant, the claimed combination of features 1 and 2 is not disclosed in the application as filed: Whereas claim 1 of the Patent in Suit (feature 2) states that the emitter area includes a doping area of a second conductive type dopant opposite to the first conductive type dopant, para. [0079] in the application as filed discloses that in the case of the presence of a second portion 20b the base area is undoped, i.e. without a first conductive type dopant.

Para. [0079] in the application as filed reads:

[0079] Referring to FIG. 8, in the solar cell according to the embodiment of the invention, the emitter area 20 includes a second portion 20b including a doping area formed in the semiconductor substrate 10. That is, the semiconductor substrate 10 may include the base area 110 as an undoped region and the second portion 20b of the emitter area 20 formed by doping the semiconductor substrate 10 with a dopant having a conductive type different from the semiconductor substrate 10. As a result, the second portion 20b may have the same crystalline structure as the base area 110. The emitter area 20 may be formed by a variety of doping methods (for example, thermal diffusion, ion implantation or the like).

The Court is with the EPO (provisional opinion of the Board of Appeal, Exhibit K 43) of the opinion that the decisive part of para. [0079] is

“... emitter area 20 formed by doping the semiconductor substrate 10 with a dopant having a conductive type **different** from the semiconductor substrate 10.”

Para. [0079] explicitly mentions that the emitter area 20 is formed by doping the semiconductor substrate 10 with a dopant having a conductive type different from the semiconductor substrate 10. In this context, the word “different” can only be understood to mean that also the semiconductor substrate is doped, but with a different dopant. The term “undoped” in para. [0079] therefore refers to the second conductive type of doping and does not mean that the base area is not doped at all.

c. **Emitter area formed in a front side**

With respect to feature 2.2 the defendants argue that the term “front side” does not appear in the application as filed. The location of the second portion 20b of the emitter area is exemplarily described to be “in an inner portion of the semiconductor substrate 10 adjacent to the front surface” (cf. para. [0094]). The requirement “adjacent to the front surface” is much narrower than “front side”. Thus, the use of the term “front side” broadens the scope of claim 1 beyond the contents of the application as filed.

In order to understand the teaching of the patent, the skilled person does not only refer to the patent description but also to the drawings. It is therefore irrelevant whether a particular term (“front side”) appears literally in the description, as long as the feature is clearly apparent from the description when read in conjunction with the drawings. This is the case here with regard to the term.

The skilled person already understands from para. [0094] and Fig. 8 of the Original Application that the emitter area 20, 20b is located in the front side of the substrate.

d. [Features from different embodiments](#)

The defendants argue that the features of claims 1 are based on very different passages of the specification describing different embodiments. Thus, even though the application as filed might comprise the single features of the claimed subject matter, it does not disclose the subject matter of claim 1 in that particular individual form.

There may be no embodiment in the description of the Patent in Suit with only the features present in claim 1. However, as pointed out within the preliminary opinion of the EPO Board of Appeal (Exhibit K 43, page 15/16), the Court agrees that original Figure 8 shows all the features present in claim 1.

e. [Electrodes directly connected to the emitter area/back surface field area](#)

Features 7 and 8 require that the first/second electrode is directly connected to the emitter area/back surface field area.

The defendants claim that the requirement "directly" has not been part of the disclosure as originally filed.

Reading the claim with a mind willing to understand, the electrodes must always be connected to the outermost portions of the emitter area/back surface field area.

The anti-reflective films 22 and 32 shown in Figure 8 in addition are presented as being optional in the description with regard to original para. [0063], [0044], [0062], [0075], [0088] and [0135]. Thus, their absence from claim 1 does not violate Art. 123(2) EPC.

With the claimant and the EPO Board of Appeal (Exhibit K 43) the Court is of the opinion that Figure 2 in conjunction with para. [0050] and [0051] describes electrodes consisting of finger electrodes and a bus bar electrode which may be connected to the emitter/back surface field area through either a single opening or plural openings of the passivation films, depending on whether the bus bar electrode passes through or is formed on the respective passivation film. Therefore, defendant's argument does not apply.

2. Lack of enabling disclosure

As far as the defendants claim that the Patent in Suit lacks a sufficient disclosure that enables a person skilled in the art to realize the claimed subject matter, the Court is not convinced by this argument.

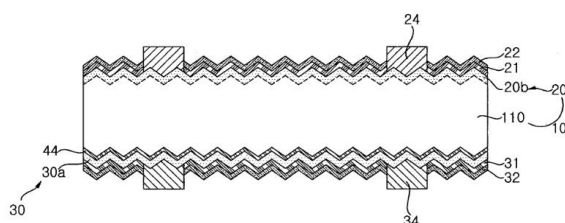
The defendants argue that claim 1 cannot be carried out by a person skilled in the art as features 3 and 4 comprise conflicting requirements. Both feature 3 and 4 would require that the respective layer (first tunneling layer; back surface field area) is on the back surface of the substrate.

The claimant correctly referred to para. [0015], which states:

“... it will be understood that when one element such as a layer, a film, a region or a plate is referred to as being "on" another element, **the one element may be directly on the another element, and one or more intervening elements may also be present.** In contrast, when one element such as a layer, a film, a region or a plate is referred to as being "directly on" another element, one or more intervening elements are not present.”

Furthermore, various embodiments of the claimed subject matter which the skilled person can reproduce are also shown in Fig. 8, 9, 11, 13 and 14 of the patent in suit. Figure 8 is shown below as an example where the first tunneling layer (44) is directly on the substrate (110) and the back surface field area (30) is on top of the first tunneling layer hence having an intervening element (first tunneling layer) between the back surface field area and the substrate.

FIG. 8



is 'inside' this substrate, being below the emitter area (110). If so, however, the transition region (340) is to be assumed also located within this substrate (and not *formed over* a back surface of the substrate), because both transition regions (330) and (340) do not differ in so far, as can be seen in para. [0048] and [0052] of D20.

Conversely, if the transition region (340) is considered – as in the Patent in Suit – to be *formed over* a back surface of the substrate, then also the transition region (330) must be assumed to be *formed over* the substrate and therefore emitter area (110) of D20 is no longer *formed in* a front side of the substrate due to presence of the transition region (330).

Ultimately, there is no indication anywhere in D20 that the transition region (340) is functionally a layer with a (quantum mechanical) tunneling effect. This transition region is not a layer in the sense of the Patent in Suit, but only a doping transition region *in* the substrate with a different doping concentration unavoidably formed by diffusion.

Hence, the structure of a solar as shown in D20 is different compared with a solar cell shown in the Patent in Suit. Therefore, the invention described in the Patent in Suit is novel over D20.

4. Lack of inventive step

The question of whether the invention required an inventive step is in dispute between the parties.

An European patent is only validly granted for an invention if – apart from other requirements – it involves an inventive step. An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art (Art. 56 EPC).

a. Legal Standard for assessing inventive step

The approach taken by the Unified Patent Court when establishing inventive step is as follows (UPC_CoA_528/2024, decision of 25 November 2025, Amgen v

Sanofi, para. 123 subsequent; UPC_CoA_464/2024, decision of 25 November 2025, Edwards v Meril, para. 131 subsequent):

It first has to be established what the object of the invention is, i.e. the objective problem. This must be assessed from the perspective of the skilled person, with its common general knowledge, as at the application or priority date (also referred to as the relevant date) of the patent. This must be done by establishing what the invention adds to the state of the art, not by looking at the individual features of the claim, but by comparing the claim as a whole in context of the description and the drawings, thus also considering the inventive concept underlying the invention (the technical teaching), which must be based on the technical effect(s) that the skilled person on the basis of the application understands is (are) achieved with the claimed invention.

In order to avoid hindsight, the objective problem should not contain pointers to the claimed solution. The claimed solution is obvious when at the relevant date the skilled person, starting from a realistic starting point in the state of the art in the relevant field of technology, wishing to solve the objective problem, would (and not only: could) have arrived at the claimed solution.

The relevant field of technology is the field relevant to the objective problem to be solved as well as any field in which the same or similar problem arises and of which the person skilled in the art of the specific field must be expected to be aware.

A starting point is realistic if the teaching thereof would have been of interest to a skilled person who, at the relevant date, wishes to solve the objective problem. This may for instance be the case if the relevant piece of prior art already discloses several features similar to those relevant to the invention as claimed and/or addresses the same or a similar underlying problem as that of the claimed invention. There can be more than one realistic starting point and the claimed invention must be inventive starting from each of them.

The skilled person has no inventive skills and no imagination and requires a pointer or motivation that, starting from a realistic starting point, directs it to implement a next step in the direction of the claimed invention. As a general rule, a claimed solution must be considered not inventive / obvious when the skilled

person would take the next step prompted by the pointer or as a matter of routine, and arrive at the claimed invention.

A claimed solution is obvious if the skilled person would have taken the next step in expectation of finding an envisaged solution of his technical problem. This is generally the case when results of the next step were clearly predictable, or where there was a reasonable expectation of success.

The burden of proof that the results were clearly predictable or the skilled person would have reasonably expected success, i.e. that the solution he envisages by taking the next step would solve the objective problem, lies on the party asserting invalidity of the patent.

b. [Numerous combinations from the prior art](#)

The defendants with their Counterclaim asserted numerous different combinations from the prior art with regard to the alleged lack of inventive step, which not consistently pursued in the further course of the proceedings. The various combinations are summarized in the following table.

No.	Counterclaim		Reply to defence to the Counterclaim	
	starting point	+	starting point	+
1	D22	D6	D22	D6
2		D8		
3		D23		
4		D24		
5		E2		
6		D20		
7		D30		
8		D31		
9	D25	common general knowledge		D25
10		D6		D6
11		D8		
12		D20		
13	D22			
14	D29	D30		
15		D7		
16		D6		
17		D8		
18		D20		
19	D22			
20	D7	D26	D7	D26
21	D27	D7		
22		D6		
23		D20		
24		D8		
25	D26	D6		
26		D8		
27		D7		
28		D20		
29		22		
30	D6	common general knowledge		
31		D28		
32		D9		
33		D26		
34		D27		
35		D31		
36	D31	D22		
37	D17	common general knowledge		
38		D7		
39		D6		
40	D8	D22		
41			D8	---
42				common general knowledge
43	D3	common general knowledge		
44			D28	D6
45				D31
46				D33

In preparation for the oral hearing, the defendants stated that the following arguments concerning lack of inventive step were considered to be the most promising:

1. D28 in combination with D31 or D33
2. D8 as such or in combination with common general knowledge
3. D22 in combination with D6
4. D25 in combination with common general knowledge
5. D7 in combination with D26

c. [Lack of inventive step in view of D28 \(US 2010/0275984 A1\) in combination with D33 \(US 2013/0042913 A1\)](#)

Neither D28 nor D33 have been chosen as a starting point in the Counterclaim for revocation. Defendants did not assert a lack of inventive step based on a combination of D28 and D33 within the Counterclaim for revocation (hereinafter also "Counterclaim"). D33 has been introduced as prior art document in the opposition proceedings with the statement setting out the grounds of appeal for the first time and with the Reply to the defence to the Counterclaim for revocation in the proceedings at hand.

The claimant requested not to admit D33 as prior art document and not to admit a combination of D28 and D33 as validity objection.

Defendants have put forward the following arguments for admissibility:

- D33 has been introduced in the EPO proceedings on 26 February 2025 and thus had previously been known to the claimant
- D33 was introduced to rebut claimant's allegation in the Defence to the Counterclaim that the thin tunneling layer is a key feature and to show that the tunnel layer was well known; therefore the defendants could not have presented this earlier
- D33 is combined with D28 instead of D22 as a Reply to claimant's allegation that D22 does not have a polysilicon back surface field layer. Choosing D28

instead of D22 thus streamlines the invalidity discussion for the sake of procedural efficiency

- The combination of D33 and D28 is essentially identical to the argument of D6 and D28; in both cases the person skilled in the art finds the missing feature (tunneling layer) in the combination document; illustrating obviousness with another exemplary document is not a new attack if the attack and the character of the combination document remain unchanged

The defendants' arguments are not convincing:

- Insofar as the defendants argue that D33 had previously been known to the claimant from the EPO proceedings, this argument must be rejected. With regard to Rule 263 RoP, it is irrelevant whether the *claimant* was already aware of a document submitted only with the Reply; what matters is why the *defendants* did not introduce it with the Counterclaim. It should be noted that the defendants did not argue that they were unaware of the document at the time the Counterclaim was filed.
- Insofar as the defendants argue that D33 was introduced to rebut claimant's allegation that the thin tunneling layer is a key feature and to show that the tunneling layer was well known in prior art, it should be noted that the claimant already discussed this feature in its infringement action (pp. 21-22). It is clear from the Counterclaim that the defendants were also aware of the significance of this feature, which is why it is frequently referred to in the arguments on novelty (Counterclaim, note 110) and inventive step (Counterclaim, notes 123, 153, 160, 161, 162, 166, 171 etc.). For example, note 153 states:

“The tunneling layer was, like the other features of the claim's arbitrary combination, known from the prior art and readily available as part of the skilled person's standard repertoire.”

This clearly refutes defendants' argument that it was only claimant's Reply that prompted them to explain the known nature of this feature in the prior art and to refer to D33 in this respect.

- Insofar as the defendants argue that D33 was combined with D28 instead of D22 as a Reply to claimant's allegation that D22 does not have a polysilicon back surface field layer, it has first to be noted that the Counterclaim does not contain a combination of D28 and D22 at all (see table above).
- The argument that the combination of D33 and D28 is essentially identical to the argument of D6 and D28 is also not convincing: the defendants assert that D33 was only introduced in order to repeat an argument already put forward with reference to a different document. The defendants thus concede that there was no need to introduce D33, since the same facts had already been substantiated with D6; furthermore, there is no justification as to why the same facts, which had already been explained in the cc with reference to D6, could not have been explained in the cc with the addition of D33. According to Rule 263, there is no justification for illustrating obviousness at a later point in time with another, already known document if the character of the combination document remains unchanged, if the same could already have been done with the Counterclaim.

Since defendant's statement did not provide any justification for why D33 was only introduced with the Reply, this argument must therefore be considered as late filed. The claimant's request not to admit D33 as prior art document is granted.

Regardless of this, the Reply, which only deals with D33 in this respect (notes 91 – 97), does not provide a comprehensible explanation of a combination of D33 and D28.

d. [Lack of inventive step in view of D28 \(US 2010/0275984 A1\) in combination with D31 \(US 2012/0000528 A1\)](#)

Documents D28 and D31 have been introduced with the Counterclaim for revocation. Nevertheless, defendants did not assert a lack of inventive step based on a combination of D28 and D31 within the Counterclaim for revocation, but for the first time with the Reply to the Counterclaim. D28 has not been chosen

as a starting point in the Counterclaim for revocation. D31 as a starting point has been combined with D22 in the Counterclaim for revocation.

The claimant requested not to admit a combination of D31 and D28 as validity objection.

Defendants have put forward the following arguments for admissibility:

- D31 has already been filed with the Counterclaim
- D31 is used as a direct Reply to claimant's allegation in the Defence to the cc that the thin tunneling layer is a key feature and to show that the tunnel layer was well known; therefore the defendants could not have presented this earlier.
- D31 is combined with D28 instead of D22 as a Reply to claimant's allegation that D22 does not have a polysilicon back surface field layer. Choosing D28 instead of D22 thus streamlines the invalidity discussion for the sake of procedural efficiency.

The defendants' arguments are not convincing:

- Insofar as defendants argue that D31 has already been filed with the Counterclaim defendants must be asked why D31 was not already used in the Counterclaim to represent the state of the art in combination with D28. The panel cannot see any reason for this.
- Insofar as the defendants argue that D31 was introduced to rebut claimant's allegation that the thin tunneling layer is a key feature and to show that the tunneling layer was well known in prior art, it again has to be noted that the claimant already discussed this feature in its infringement action (pp. 21-22). It is clear from the Counterclaim that defendants were also aware of the significance of this feature, which is why it is frequently referred to in the arguments on novelty (note 110) and inventive step (notes 123, 153, 160, 161, 162, 166, 171 etc.) in their Counterclaim. For example, note 153 states:

“The tunneling layer was, like the other features of the claim’s arbitrary combination, known from the prior art and readily available as part of the skilled person’s standard repertoire.”

This clearly refutes defendants’ argument that it was only claimant’s Reply that prompted them to explain the known nature of this feature in the prior art and to refer to D31 in this respect.

- Insofar as the defendants argue that D31 was combined with D28 instead of D22 as a Reply to claimant’s allegation that D22 does not have a polysilicon back surface field layer, it has first be noted that the Counterclaim does not contain a combination of D28 and D22 at all (see table above).

Since the defendant’s statement does not provide any justification for why D31 in combination with D28 was introduced with the Reply for the first time, the argument that D31 renders the patent obvious in view of D28 is late filed. Since both documents were already the subject of the Counterclaim, it would have been easy for the defendants to submit this combination with their Counterclaim.

Since the defendant’s statement did not provide any justification for why D31 in combination with D28 was only introduced with the Reply, this argument must therefore be considered as late filed. The claimant’s request not to admit D33 as prior art document is granted.

Regardless of this, however, it is also not apparent what could have prompted the person skilled in the art to implement a tunneling layer based on D28, which aims to simplify manufacturing.

e. [Lack of inventive step in view of D8](#)

With their Counterclaim for revocation the defendants asserted a lack of inventive step due to a combination of D8 *and* D22. This argument was no longer addressed in the Reply to the defence to the Counterclaim. With their Reply they claimed the person skilled in the art would reach the claimed subject matter in an obvious fashion by consulting D8 alone.

The claimant requested not to admit validity attacks starting from D8.

Given that D8 has already been asserted as a starting point with the Counterclaim, there is no reason to *generally* reject the defendants' request for "obviousness starting from D8."

However, there is no apparent reason to accept D8 *on its own* as a validity attack. According to the Counterclaim, the defendants still considered it necessary to combine D8 with D22 in order to demonstrate a lack of inventive step. In view of this, it is inexplicable why D8 should be sufficient on its own in the Reply to prove the same, especially since this could have been argued in any case with the Counterclaim.

This argument must therefore be considered as late filed. The claimant's request not to admit D8 *on its own* as argument for lack of inventive step is granted.

Regardless of this, it is contradictory to argue with the Counterclaim for revocation that

"...D8 differs from claim 1 in that the emitter area is not formed in the substrate and that the electrodes are not directly connected to the emitter or the back surface field area",

while the defendants with their Reply to the defence to the Counterclaim state that a second portion of the emitter area is in the substrate and the person skilled in the art would connect the electrodes directly to the emitter area.

f. [Lack of inventive step in view of D8 in combination with common general knowledge](#)

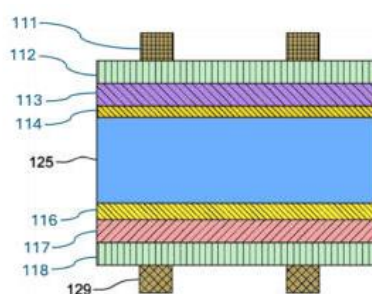
With their Reply to the defence to the Counterclaim (note 132) defendants asserted a lack of inventive step due to a combination of D8 and common general knowledge for the first time.

The claimant objected to this as being late filed.

The defendants have stated that D8 in combination with common general knowledge was intended to counter the claimant's argument in its statement of

defence to the Counterclaim that D8 fails to disclose features 7 and 8, because the contacts in D8 are not directly connected to the emitter.

However, the claimant's argument for this in the Statement of defence has been that layers 114, 116 (D8) block diffusion between layers 113, 117 and the silicon substrate 125:



In view of this, the defendant's argument regarding a combination of D8 and common general knowledge is not a response to claimant's submission: The submission in note 132 of defendant's Reply concerns the co-firing of layers 112 and 118 and not layers 113 and 117, to which the claimant referred in its statement of defence.

In addition, defendants already in their Counterclaim argued that the electrodes in D8 are not directly connected to the emitter (Counterclaim notes 360, 361). In view of this, there would have been reason to include note 132 of the Reply ("...well-known technique ... to connect electrodes directly to the respective emitter...") in the Counterclaim.

This argument must therefore be considered as late filed. The claimant's request not to admit D8 in combination with common general knowledge as argument for lack of inventive step is granted.

g. [Lack of inventive step in view of D22 \(JP 3 158 027 B2\) in combination with D6 \(US 2011/0162706 A1\)](#)

With their Counterclaim for revocation the defendants asserted a lack of inventive step due to a combination of D22 and D6.

Both parties agree that claim 1 differs from D22 at least with regard to the tunneling layer. For the defendants, adding a tunneling layer to D22, which was known and disclosed by D6, was obvious to the skilled person, because the patent does not disclose any special technical effect of this feature.

The claimant has correctly asserted in this regard that D22 teaches away from the insertion of a tunneling layer in the position claimed (between the back surface of the substrate and the back surface field area) as D22 aims at having a direct contact between the back surface of the substrate and the back surface field area. The defendants did not contest this argument.

The same applies to any combination starting from D22.

h. [Lack of inventive step in view of D25 \(EP 2 312 650 A2\) in combination with common general knowledge](#)

With their Counterclaim for revocation the defendants asserted a lack of inventive step due to a combination of D25 and common general knowledge.

The defendants admit that D25 fails to disclose features 9.1 and 9.2. The back surface field area in D25 is made of Aluminium-based material. Defendants did not show any real motivation for the skilled person to replace the Aluminium-based material of D25 with the polycrystalline silicon of feature 9.1 of the claim. The blanket statement that a person skilled in the art is always eager to improve the prior art is insufficient to demonstrate a concrete motivation, especially since in D25 other processes are described as less effective than ALD-processes to create the aluminium compound.

The same applies to a combination of D25 and D6.

i. [Lack of inventive step in view of D7 \(US 2009/0205712\) in combination with D26 \(Weeber et al., \(2009\), "Status of n-type solar cells for low-cost industrial production", Proc. EPSEC.\)](#)

With their Counterclaim for revocation the defendants asserted a lack of inventive step due to a combination of D7 and D26.

D7 does not disclose a monocrystalline substrate. In addition, the solar cell of D7 has its emitter at the backside of substrate and not in a front side of the solar cell. Moreover, the layer 108 on the back surface of the substrate is not doped with the same type of dopant as the substrate and thus not a (first portion of a) back surface field area. This corresponds to the finding of both the Opposition Division and the Board of Appeal. As the skilled person would have to flip the entire construction of the solar cell of D7 around to transform it into a front junction solar cell, the skilled person has no reason to do so, since D7 precisely proposes an improved back junction solar cell.

Since the back junction solar cell of D26 is fundamentally different to the solar cell of D7, the skilled person cannot draw any conclusions about the rear junction solar cell of D7 from the examination of the rear junction solar cell of D26. The skilled person would therefore not consult D26 when starting from D7.

j. [Lack of inventive step in view of D6 in combination with D28](#)

In their Counterclaim, the defendants asserted a combination of D6 (starting point; see note 303) with D28 (note 319 ff.). This argument is no longer pursued in the Reply to the defence to the Counterclaim.

Instead, in their Reply, the defendants assert a combination of D28 (starting point; note 87: “A person skilled in the art ... coming from D28 would ...”) and D6 (notes 75 to 90;). This is an argument put forward for the first time in the Reply to the defence to the Counterclaim, which is not identical to the reverse combination.

The claimant objected this as being late filed.

This argument must be considered as late filed, because this argument without any apparent reason has been put forward for the first time in the Reply. The claimant's request not to admit D6 in combination with D28 as argument for lack of inventive step is granted.

Regardless of this, however, it is also not apparent what could have prompted the person skilled in the art to implement a tunneling layer based on D28 (which aims to simplify manufacturing) to the solar cell described in D6.

k. **Inventive step in view of further starting points**

Insofar as the defendants asserted further combinations in their Counterclaim, these were not pursued further in the Reply. In the Court's view, these combinations are in any case more remote than the arguments discussed above concerning the lack of inventive step.

VI. Validity of the Patent in Suit (dependent claims)

The defendants also argued that dependent claims 2–15 and 17–22 are invalid.

If a sub-claim is challenged with a Counterclaim for revocation there is no need for a separate review of its validity, if this claim refers back to a valid main claim. This is the case here for all sub-claims.

VII. Infringement of the Patent in Suit

The defendants offer solar modules of the “ASTRO N” series in various countries throughout the European Union, including in Germany, France, Italy and the Netherlands.

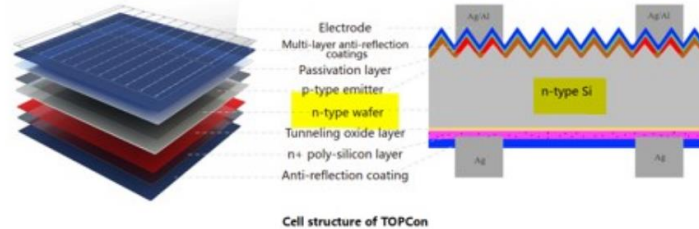
Solar modules of the series “ASTRO N” are so-called n-type TOPCon solar cells. In the defendants’ “White Paper” submitted as Exhibit K 13, which is a brochure of “ASTRO N” modules, these product series is described.

Neither this brochure nor the Statement of Defence, where the defendants did not explicitly argue that their products are different from this description, indicates that with regard to the claim features from claim 1 of the Patent in Suit a distinction has to be made between specific types of this series.

1. **Realization of claim 1 of the Patent in Suit**

a. **Claim feature 1**

The claimant presented defendant’s White Paper (Exhibit K 13), which discloses the structures of the TOPCon solar cells manufactured by Defendants:

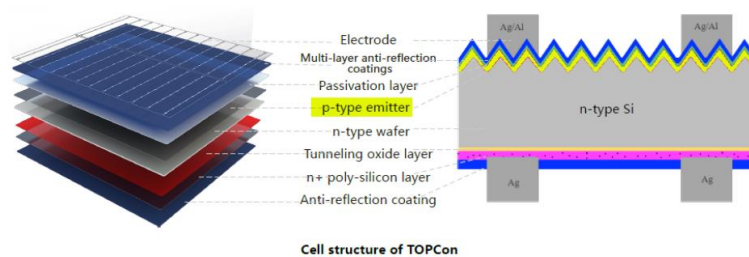


The illustration shows a base area (“wafer”) made of Silicon (“Si”). The silicon substrate has a monocrystalline structure. This is also confirmed in the claimant’s test report (Exhibit K 16, p. 4 under 2.1) and the data sheet Exhibit bundle K 15 (“Cell type – n-type Mono-crystalline”).

The base area of the monocrystalline silicon substrate includes phosphorus as first conductive type dopant, which according to para. [0021] of the Patent in Suit is a known n-type dopant.

b. Claim feature 2

The White Paper (Exhibit K 13) further proves that TOPCon solar cells manufactured by defendants comprises a p-type emitter area formed in the front side of the silicon substrate:



Accordingly, the emitter area uses a conductive type dopant with opposite conductivity (p-type) to the n-type doped silicon substrate. This is explicitly stated in the defendants’ Technical Report, provided as Exhibit K 14 by the claimant:

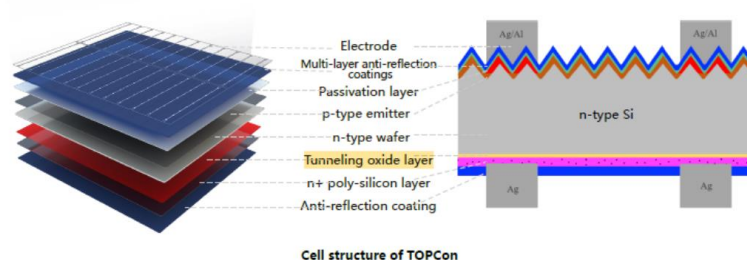
Currently, TOPCon SE mass production uses boron expansion after laser direct doping + oxidation, only increase the laser and oxidation equipment, the experimental efficiency increase of 0.25 ~ 0.35%, in February Astronergy laser SE has completed mass production introduction

For determining patent infringement, it is irrelevant whether boron (as stated by the defendants themselves in the Technical Report) or aluminum (as per the claimant's test results) as second conductive type dopant is used.

c. **Claim feature 3**

TOPCon solar cells further comprises a first tunneling layer consisting of silicon oxide (SiO_x) and entirely formed over a back surface of the monocrystalline silicon substrate.

In the White Paper's illustration of a TOPCon cell structure the tunneling layer is described as "tunneling oxide layer" and "ultra-thin tunneling silicon oxide (SiO_2) layer" (Exhibit K 13, p. 4):



As can already be seen from the illustration in the White Paper the tunneling layer is entirely formed over the surface. Furthermore, the White Paper explicitly states:

“... an ultra-thin tunneling silicon oxide (SiO_2) layer and a thin highly doped polysilicon layer are deposited on the rear of the TOPCon cell. **According to the quantum tunneling effect**, the SiO_2 layer with a thickness of 1~2nm can not only allow electrons to pass through smoothly, but also prevent the recombination of holes.”

This effect therefore can be assumed to exist across the entire surface. Consequently, it is irrelevant whether there are pinholes and openings, if their scope does not prevent the aforementioned effect in any case. Nothing else can be inferred from the expert opinion submitted by the defendants (Exhibit TW 43). Only such openings, which inhibit the targeted effect of the layer, could lead to

the assumption of non-infringement. The clear statements in the White Paper already speak against such an assumption.

Insofar as the defendants argue, the presence of dopant would be very relevant for the question of a tunneling layer, neither the claimant's submission nor the Patent in Suit indicate that such presence must exclude the existence of a tunneling layer. It should be noted at this point that the defendants in case of the accused products refer to a layer with a “quantum mechanical tunneling effect” despite the presence of the dopant phosphorus with a high concentration.

Insofar as the defendants argue that their own test results have established that the alleged “tunneling layer” does not provide a tunneling effect, this clearly and obviously contradicts their own advertising in the White Paper. It has to be noted that the term “tunneling effect” in the Patent in Suit does not deviate from the knowledge of a person skilled in the art. Therefore, the technical term “tunneling effect” as used in the Patent in Suit means nothing different than in the White Paper.

The defendants must therefore adhere to their clear statements in their White Paper. Under this circumstances, the Court does not agree with the defendants' assertion that the existence of a tunneling layer with a quantum-mechanical tunneling effect for the accused products is not demonstrated and that pinholes and trenches present in the accused products' oxide layers, however they may have arisen, are detrimental to and exclude a relevant tunneling effect.

Insofar as the defendants claim that, due to pinholes and openings in the silicon oxide layer, the accused products have no layer ‘entirely formed over’, reference is made to IV. 2. B. cc. (2.).

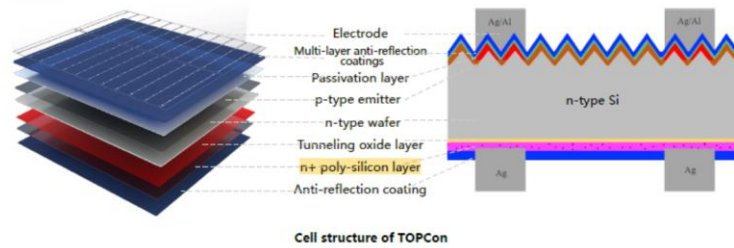
Hence, the accused products do comprise a tunneling layer in the sense of feature 3.

c. [Claim feature 4](#)

The contested TOPCon solar cells further comprise a back surface field area on the back surface of the monocrystalline silicon substrate, wherein the back

surface field area comprises a first portion which is disposed on the first tunneling layer.

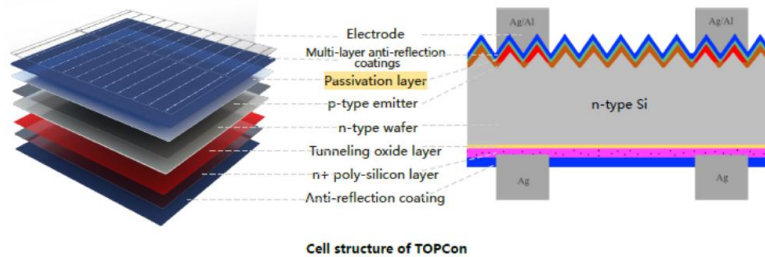
This is already apparent by the White Paper (Exhibit K 13):



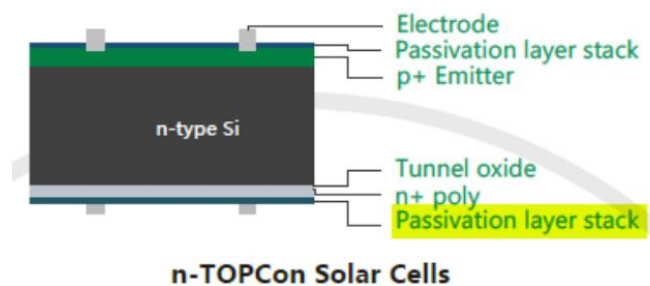
n-TOPCon refers to the tunnel oxide passivated contact technology on n-type silicon wafer. The cell structure is shown in the figure above. The front surface is essentially the same as that of the conventional n-PERT cell, the main difference is that an ultra-thin tunneling silicon oxide (SiO_2) layer and a thin highly doped polysilicon layer are deposited on the rear of the TOPCon cell. According to the quantum tunneling effect, the SiO_2 layer with a thickness of 1-2nm can not only allow electrons to pass through smoothly, but also prevent the recombination of holes. The passivation contact structure formed by SiO_2 layer and doped polysilicon layer can effectively reduce the surface recombination and metal contact recombination, thereby improving the open circuit voltage (V_{oc}) and fill factor (FF) of the cells.

d. Claim features 5 and 6

TOPCon solar cells further comprise a first passivation film formed on the emitter area on the front side. The presence of a passivation layer formed on the emitter layer is supported by the White Paper (Exhibit K 13):

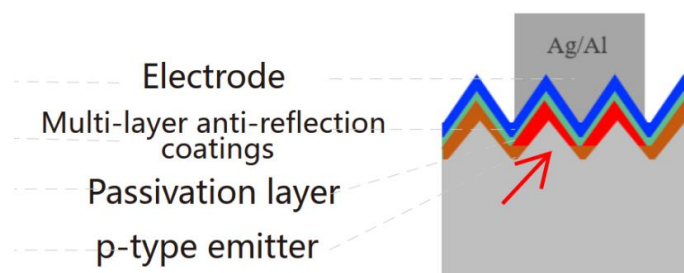


TOPCon solar cells further comprise a second passivation film formed on the back surface field area as again shown by the White Paper (Exhibit K 13):

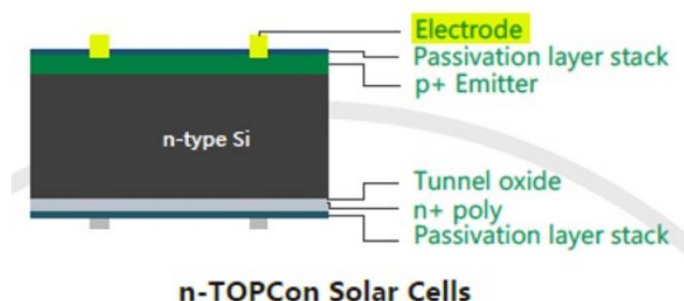


e. Claim features 7 and 8

TOPCon solar cells further comprise a first electrode directly connected to the emitter area through a plurality of openings of the first passivation film. The cell structure depicted of Defendants' White Paper (Exhibit K 13) shows a contact area (red) between the electrode (dark grey) and the "p-type emitter" (brown)

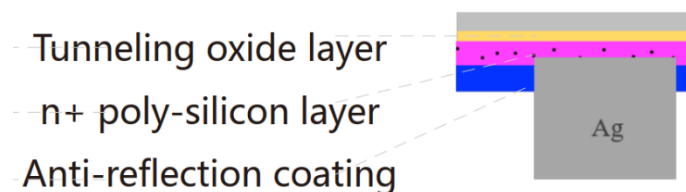


From the schematic drawing on page 3 of the White Paper (Exhibit K 13), it is apparent that the first electrode is directly connected to the emitter area through openings in the passivation layer; otherwise, no electron flow could take place:



As far as the defendants in response to this claim that the Statement of claim includes no facts or evidence for the presence of this feature in any of the accused products, in the Court's view this does not constitute a substantiated dispute. In addition, reference is made to the further test report (Exhibit K 34).

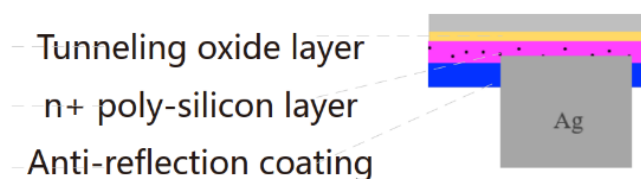
TOPCon solar cells further comprise a second electrode directly connected to the back surface field area through a plurality of openings of the second passivation film, as depicted in the White Paper (Exhibit K 13):



f. Claim feature 9

The contested solar cells further comprise a first portion of the back surface field area being formed of a polycrystalline silicon and being doped with the first conductive type dopant.

These findings again follow from the White Paper (Exhibit K 13):



According to the tested sample the dopant of the back surface field area is phosphorus.

2. Realization of claim 12 of the Patent in Suit

Claim 12 of the Patent in Suit refers back to claim 1 and requires that the emitter area (20) includes a first region (201) having a high dopant concentration and a second region (202) having a lower dopant concentration than the first region (201), wherein the first region (201) contacts at least a part of the first electrode (24) and the second region (202) is formed in a region of the emitter area (20) between the first electrode (24) directly connected to the emitter area (20) through the plurality of openings of the first passivation film (21).

The defendants have argued that the additional features of claim 12 currently are not present in any of the accused products, because the Defendants introduced a new technology (“LIF technology”) in 2024, which substitutes the “SE

technology” (SE = “selective emitter”). According to the defendants' statement, this LIF technology does not implement the features of claim 12. The Defendants' N5 bifacial/monofacial and N5s monofacial series used SE technology from February 2023 to February 2024. This statement is understood by the Court to mean that the features of subclaim 12 were realised with the “SE technology”.

For the finding of an infringement, it is sufficient that an infringement has taken place in the past.

3. Realization of claims 5, 6, 7, 13, 14 and 15 of the Patent in Suit

Realization of claims 5, 6, 7, 13, 14 and 15 of the Patent in Suit has not explicitly been disputed in the statement of defence. The same applies with respect to the amendment of claim 13 with regard to the submission in the rejoinder.

4. Realization of claims 2, 3, 4, 9 and 10 of the Patent in Suit

The reason to include subclaims 2, 3, 4, 9 and 10 of the Patent in Suit in the claims of the infringement action was that the auxiliary requests 8, 9, 10 and 14 in the application to amend the patent include features of these subclaims.

Auxiliary request 8 includes the features of dependent claims 2 and 3. Auxiliary request 9 includes the features of dependent claim 9. Auxiliary request 10 includes the features of dependent claims 4 and 10.

Due to the filing of these auxiliary requests, which referred to subclaims 2, 3, 4, 9 and 10 as granted, the claimant asserted the infringement of these subclaims for the first time in the Reply to the Statement of defence.

By order of 31 March 2025, the Court admitted the corresponding application to amend the infringement action on the following grounds:

“If dependent patent claims are made the subject of auxiliary requests within an application according to Rule 30 RoP, it must also be possible for the patentee to make corresponding amendments with regard to the infringement action. Otherwise, although it would be possible to amend the patent, infringement of such an amended version could not be the subject of the corresponding infringement action.”

This connection between auxiliary requests and the respective amendment of the infringement action means that a decision on the amended part of the infringement action is only to be made if a decision on the corresponding auxiliary requests was required. The relevance of the auxiliary requests is therefore an implicit condition for the decision on the amended part of the infringement action. However, if the patent is to be upheld as granted, there is no reason to decide on the correspondingly extended infringement action.

Since no decision has to be made on the auxiliary requests, an examination of whether the aforementioned claims were infringed is no longer necessary.

VIII. No sufficient presentation of facts to assume a market abuse

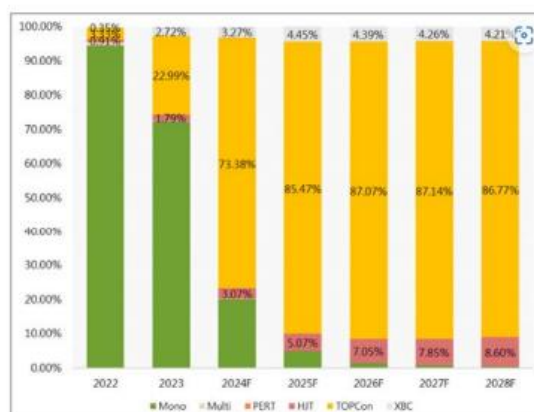
As far as defendants claim that the infringement action is unfounded, because the claimant as a dominant company exercises its market position in a discriminatory manner, the court considers this argument to be unsubstantiated.

With their Statement of defence, defendants argued as follows: The TOPCon technology is a *de facto standard*, whereby the patent in suit is one of the patents relevant to this technology. Solar panel manufacturers must be able to offer modules of this technology. Otherwise they are effectively excluded from the market. Such an exclusion constitutes market abuse. Three companies (claimant, Jinko and Trina) divide the market between themselves and use the split of the portfolio to ensure exclusion of competitors whereas they in parallel receive additional royalties based on the license agreements concluded. As consequence of this abuse of market power, the claimant is not entitled to an injunction for violation of Art. 102 TFEU. In contrast, the defendants are entitled to claim the production of the corresponding documents and agreements concluded by the claimant's group with Jinko and Trina.

By order of 19 March 2025, the court noted that, on the basis of the Defendants' existing submissions, the existence of the factual prerequisites for the alleged violation of antitrust law ("de facto industry standard") cannot be assessed, because the submissions do not provide any information of sufficient substance

to define and assess the relevant market, to identify the market participants and to answer the question of market dominance.

In response, the defendants argued that TOPCon technology is currently the standard for the solar panel market (PV market), since TOPCon modules will in the future years capture 70% to 80% of the PV market. In the defendant's opinion, this is demonstrated by the following illustration (source: www.pv-magazine.com):



Proportion of Global Different N-type Cells Production Unit: GW, Trend Force

During the oral hearing, the defendants conceded that the representation of market development within this chart for the years 2024 and beyond is merely a forecast that is not supported by valid figures.

A dominant position in relation to other market participants is conceivable if two or more independent companies jointly have a technological advantage on the basis of an agreement or license agreement, which would give them a significant opportunity to behave independently towards their competitors, customers and ultimately consumers (Judgment of the European Court of First Instance (First Chamber) of 10 March 1992, joined cases T-68/89, T-77/89 and T-78/89).

However, the examination of such a (collective) dominant market position cannot be based on a *forecast* for the development of the relevant market, but only on valid figures. The alleged dominant market position of the claimant also does not result from other documents submitted (Exhibit TW 4: 'TOPCon technology highly market-relevant'; Exhibit TW 5: Global Solar Cell Patent Rankings; Exhibit

TW 28: 2024 top 10 manufacturers' module shipment share by formats; Exhibit TW 29; Exhibit TW 37: ITRPV forecast; etc.).

Therefore, the application for production of documents was to be rejected. The assumption of a dominant market position on the part of the claimant cannot be justified in this situation either.

IX. Proportionality

The submission on proportionality in the statement of defence is insufficient. The defendants merely made a blanket assertion that if the other arguments do not lead to the immediate dismissal of the injunction, they at least have to be taken into account in the proportionality test prescribed by Article 63 (1) UPCA, which leads to the conclusion of the defendants that the issuance of an injunction is not proportionate.

X. Preliminary damages

The claimant is entitled to an interim award of costs. The legal basis is Art. 69(1) UPCA and Rule 150.2 RoP (UPC_CoA_464/2024; decision of 25 November 2025, Edwards v Meril, para. 201 subs.).

As a general rule, Art. 69(1) UPCA and Rule 150.2 RoP do not entitle the successful party to an interim reimbursement of representation costs of more than 50% of the ceiling of recoverable costs as adopted by the Administrative Committee under Rule 152.2 RoP. The Court therefore may assume that the successful party will be entitled to 50% of the applicable ceiling and may order reimbursement of that amount by means of an interim award, unless there are clear indications that the successful party in fact incurred fewer representation costs (UPC_CoA_464/2024; decision of 25 November 2025, Edwards v Meril, para. 203).

Therefore, the claimant is entitled to an interim award of 50% of the applicable ceiling of representation costs (50% of 200.000 = 100.000) plus the court fee (€ 24.000,00). There are no clear indications that the claimant in fact incurred

fewer representation costs. Nor is there any reason to exceptionally reimburse more than 50% of the applicable ceiling as an interim award.

XI. Publication of the decision

The claimant did not present any specific reason with respect to the requested publication of the Court's decision. The corresponding requests were therefore rejected.

XII. Grace period

The court cannot see any reason or justification to grant a grace period of up to 18 months after the announcement of the decision, before an injunction, destruction and/or recall and removal can be enforced.

XIII. Security; enforceability

The defendants have requested security for the enforcement of any injunction, destruction or recall and removal in the amount of € 10 million. In support of their application for security, the defendants must present facts and arguments as to why it appears appropriate in this specific case to make the order dependent on security to be determined by the court. The defendants' submissions do not give rise to any reason to make enforcement dependent on security in the present case. This means that no security must be lodged beforehand and there is no condition under Rule 118.2 (a) RoP.

This decision is immediately and directly enforceable from the date of service in each of the Contracting Member States (R 354.1 RoP). However, Rule 118.8 RoP must be complied with.

XIV. Penalty payment and costs of compliance

Pursuant to Rule 354.3 RoP, the decisions and orders of the Court may provide for periodic penalty payments to be made to the Court in the event that a party fails to comply with the terms of the order or any previous order. The amount of such payments shall be fixed by the Court having regard to the importance of the

order in question. In the present case, a penalty payment of € 1.000,00 per day of delay seems appropriate.

Pursuant to Art. 63(2) UPCA and Rule 354.3 RoP, non-compliance with the injunction is subject to a recurring penalty payment payable to the court. In view of the product in question, it seems appropriate to impose a penalty of up to € 20.000,00 per case of non-compliance with the injunction and per infringing product.

XV. Confidentiality

The defendants have requested a confidentiality order if they have to provide information under motion IV. of the infringement action. In support of their application for confidentiality, the defendants must present facts and arguments as to why it appears appropriate in this specific case to issue a confidentiality order. The defendants' submissions do not give rise to any reason to make enforcement dependent on confidentiality in the present case.

XVI. Costs

As the losing party, the defendants must bear the costs and other expenses incurred by the claimant pursuant to Art. 69 (1) UPCA. The partial dismissals to the detriment of the claimant have no weight.

For all these reasons and after having heard the parties Panel 1 of the Local Division Munich issues the following

Decision

- I. The defendants are ordered to refrain from making, offering, placing on the market, using or importing or storing for those purposes within the territory of Germany, France, Italy and the Netherlands,

a solar cell (100) comprising: a monocrystalline silicon substrate (10) having a base area (110) including a first conductive type dopant; an emitter area (20) including a doping area of a second conductive type dopant opposite to the first conductive type dopant formed in a front side of the monocrystalline silicon substrate; a first tunneling layer (44) entirely formed over a back surface of the monocrystalline silicon substrate (10); a back surface field area (30) on the back surface of the monocrystalline silicon substrate (10), wherein the back surface field area (30) comprises a first portion (30a) which is disposed on the first tunneling layer (44); characterized in that the solar cell further comprises a first passivation film (21) formed on the emitter area (20); a second passivation film (31) formed on the back surface field area (30), a first electrode (24) directly connected to the emitter area (20) through a plurality of openings of the first passivation film (21), and a second electrode (34) directly connected to the back surface field area (30) through a plurality of openings of the second passivation film (31), wherein the first portion (30a) of the back surface field area (30) is formed of a polycrystalline silicon doped with the first conductive type dopant

(independent claim 1 of the Patent in Suit)

in particular when

the solar cell (100) according to any of the preceding claims is characterized by further comprising a first anti-reflective film (22) on the first passivation film (21)

(dependent claim 5 of the Patent in Suit)

and/or

the solar cell (100) according to any of the preceding claims is characterized by further comprising a second anti-reflective film (32) on the second passivation film (31)

(dependent claim 6 of the Patent in Suit)

and/or

the solar cell (100) according to any of the preceding claims is characterized in that the first tunneling layer (44) has a thickness of 0.5 nm to 5 nm

(dependent claim 7 of the Patent in Suit)

and/or

the emitter area (20) includes a first region (201) having a high dopant concentration and a second region (202) having a lower dopant concentration than the first region (201), wherein the first region (201) contacts at least a part of the first electrode (24) and the second region (202) is formed in a region of the emitter area (20) between the first electrode (24) directly connected to the emitter area (20) through the plurality of openings of the first passivation film (21)

(dependent claim 12 of the Patent in Suit)

and/or

the first and second electrodes (24, 34) include a plurality of finger electrodes (24a, 34a) having a first pitch (P1) and being disposed in parallel to each other and bus bar electrodes (24b, 34b) formed in a direction crossing the finger electrodes (24a, 34a)

(dependent claim 13 of the Patent in Suit)

and/or

the emitter area (20) has a p-type conductivity, and the first passivation film (21) includes at least one of aluminum oxide, zirconium oxide, and hafnium oxide having a negative charge

(dependent claim 14 of the Patent in Suit)

and/or

the back surface field area (3) has an n-type conductivity, and the second passivation film (31) includes at least one of silicon oxide and silicon nitride having a positive charge

(dependent claim 15 of the Patent in Suit)

in particular

solar cell modules of the “Astro N-Series”, especially:

- ASTRO N5 Bifacial Series
- ASTRO N5 Monofacial Series
- ASTRO N5s Monofacial Series
- ASTRO N7 Bifacial Series
- ASTRO N7s Bifacial Series
- ASTRO N8 Bifacial Series.

- II. For each case of violation of the order according to item I. the defendants are ordered to make penalty payments of up to € 20.000,00 per item to the Court.
- III. The Court finds that the Patent in Suit was infringed by the defendants in respect to the products described above under item I.
- IV. The defendants are ordered, under penalty of a periodic fine of € 1.000,00 for each day of delay, within a period of three weeks from the notification pursuant to Rule 118.8 RoP, to provide the claimant with information on the extent to which the defendants have committed the acts referred to in item I. since 31 August 2022, specifying:
 1. the origin and distribution channels of the infringing products,
 2. the quantities produced, manufactured, delivered, received or ordered, as well as the prices paid for the infringing products, and
 3. the identity of any third person involved in the manufacture or distribution of infringing products.
- V. The defendants are ordered, under penalty of a recurring fine of € 1.000,00 for each day of delay, within a period of one week from the notification pursuant to

Rule 118.8 RoP, to recall from the commercial customers the products described above under item I. that have been placed on the market since 31 August 2022, with reference to the infringement of the products determined by the Court and with the binding promise to pay any fees and necessary packaging and transport costs, as well as customs and storage costs associated with the return, and to take back the products to have them finally removed from the distribution channels.

- VI. The defendants are ordered, under penalty of a recurring fine of € 1.000,00 for each day of delay, within a period of one week from the notification pursuant to Rule 118.8 RoP, to destroy the products referred to above in item I. and/or materials in their direct and/or indirect possession and/or ownership (including any products and/or materials that come into their direct and/or indirect possession and/or ownership pursuant to item IV. above or otherwise) or, at their option, to hand them over to a bailiff to be appointed or commissioned by the claimant for the purpose of destruction.
- VII. The defendants are obligated to reimburse the claimant for any damages incurred by the claimant since 31 August 2022 due to the actions described above under item I. as well as those yet to be incurred, including interest.
- VIII. The defendants have to pay € 124.000,00 to the claimant as an interim award of costs.
- IX. The infringement action is dismissed in all other respects.
- X. The defendants' Counterclaim for revocation is dismissed in its entirety.
- XI. The defendant's request to produce evidence and all other requests are dismissed.
- XII. The defendants bear the reasonable and proportionate legal costs and other expenses incurred by the claimant in the proceedings.
- XIII. The Court declares that this decision is immediately and directly enforceable from the date of service in each Contracting Member State.

Read in open court in Munich on 28 November 2025

Dr. Matthias Zigann Presiding Judge	
Tobias Pichlmaier Legally Qualified Judge and Judge-rapporteur	
Petri Rinkinen Legally Qualified Judge	
Giorgio Checcacci Technically Qualified Judge	
For the Deputy-Registrar	

INFORMATION ABOUT APPEAL

An appeal against the present Decision may be lodged at the Court of Appeal, by any party which has been unsuccessful, in whole or in part, in its submissions, within two months of the date of its notification (Art. 73(1) UPCA, R. 220.1(a), 224.1(a) RoP).

INFORMATION ABOUT ENFORCEMENT

Art. 82 UPCA, Art. Art. 37(2) UPCS, R. 118.8, 158.2, 354, 355.4 RoP. An authentic copy of the enforceable decision will be issued by the Deputy-Registrar upon request of the enforcing party, R. 69 RegR.