Patent Right	Date	June 24, 2024	Court	Intellectual Property High Court, Fourth Division
	Case number	2023 (Gyo-Ke) 10053		
- A case in which the court rescinded a JPO decision that revoked a patent, by holding that there were errors in the determination by the JPO that the patented invention is substantially identical with the invention in Cited Document 1, could have easily been made by a person ordinarily skilled in the art based on Cited Invention 1, 2 or 3, or is identical with the invention in the earlier application.				

Case type: Rescission of Patent Revocation Decision
Result: Granted
References: Article 29, paragraphs (1) and (2) and Article 29-2 of the Patent Act
Related rights, etc.: Patent No. 6781864
Decision of the JPO: Opposition No. 2021-700369

Summary of the Judgment

1. Three opponents filed an opposition to the patent held by the Plaintiff (the "Patent") for an invention titled "Pellicle film, pellicle frame, pellicle, manufacturing method thereof, exposure original plate, exposure device, manufacturing method of semiconductor device."

In the course of the patent opposition proceedings (Opposition No. 2021-700369), the Plaintiff made a request for correction. After approving this correction, the Japan Patent Office (JPO) rendered a decision to revoke the Patent by holding that: [i] among the corrected inventions, Inventions 1 and 3 to 5 lack novelty because they are not substantially different from Cited Invention 1; [ii] a person ordinarily skilled in the art could have easily made the inventions according to the claims of the Patent (after correction; collectively the "Invention") based on Cited Invention 1, 2, or 3, and well-known art; and [iii] Inventions 1, 3 to 5, and 13 to 18 are identical with the invention based on secret prior art (the "JPO Decision").

2. In this judgment, the court rescinded the JPO Decision, holding as follows.

(1) The Invention contains the following condition expression: "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundle in the thickness direction of the carbon nanotube

sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the peak in the thickness direction of the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.4 or larger" (the condition of R_B being 0.4 or larger).

On the other hand, there is no statement or suggestion specifying the value of R_B in Cited Documents 1 and 3 or the earlier application. It cannot be found that the approach of specifying the in-plane orientation of the carbon nanotube film by R_B is stated in Cited Document 1 or any other documents available at the time of filing of the application regarding the Patent, nor can it be said that such approach was common general technical knowledge at that time.

There is no ground for the Defendant's argument that any thin-film self-supported disordered single-walled carbon nanotube sheet usually satisfies the condition of R_B being 0.4 or larger.

Consequently, the JPO Decision contains errors in the determination on novelty (Inventions 1 and 3 to 5) and an inventive step based on Cited Invention 1, determination on an inventive step based on Cited Invention 3, and determination as to whether the invention claimed in the earlier application is identical with Inventions 1, 3 to 5, and 13 to 18.

(2) Regarding the determination on an inventive step made by using Cited Document 2 as the primary cited document, although the "oriented single-walled carbon nanotube bulk structure" is different from an "optical product" in Cited Document 2, the JPO Decision determined Cited Invention 2 based on an erroneous assumption that the "oriented single-walled carbon nanotube bulk structure" in itself is an "optical product," and this error affected the conclusion of the decision.

In addition, the "oriented single-walled carbon nanotube bulk structure" in Cited Document 2 consists of an aggregation of multiple carbon nanotubes standing vertically. If bundles are entangled with each other to form a "network" as in the Invention, it is no longer an "oriented single-walled carbon nanotube bulk structure." Thus, there is an obstructive factor for such application of this structure, and in this respect as well, the JPO Decision contains an error in the determination as to whether a person ordinarily skilled in the art could have easily conceived of the difference.

Judgment rendered on June 24, 2024
2023 (Gyo-Ke) 10053, Case of seeking rescission of patent revocation decision
Date of conclusion of oral argument: May 8, 2024

Judgment

Plaintiff: Mitsui Chemicals, Inc.
Plaintiff: National Institute of Advanced Industrial Science and Technology

Defendant: Commissioner of the Japan Patent Office

Main text

1. The part where the patents related to Claims 1 and 3 through 18 of Patent No. 6781864 were revoked from the decision made by the Japan Patent Office (the "JPO") on March 30, 2023, concerning Opposition No. 2021-700369, shall be rescinded.
2. The Defendant shall bear the court costs.

Facts and reasons

[Abbreviations]

Abbreviations as used in the Judgment are as stated in Attachment 1 "List of Abbreviations." Abbreviations as used in the JPO Decision are also used in the Judgment without any change, in principle.

No. 1 Claim

Same as the main text.

No. 2 Outline of the case

1. Outline of procedures at the JPO (There are no disputes between the parties.)

(1) The Plaintiffs filed a patent application for an invention titled "Pellicle film, pellicle frame, pellicle, manufacturing method thereof, exposure original plate, exposure device, manufacturing method of semiconductor device" on July 3, 2017 (date of the priority claim is July 5, 2016), and obtained registration of establishment of the patent right related to the Patent on October 21, 2020 (number of claims: 23), and the Patent Gazette was issued on November 11, 2020.

(2) Concerning the Patent, oppositions to the granted patent (3 cases, including [i] as of April 23, 2021 [for the patent related to Claims 1 through 18]; [ii] as of May 7, 2021; and [iii] as of May 11, 2021 [for the patent related to Claims 1 through 23]) were filed and the JPO examined these oppositions as Opposition No. 2021-700369.

(3) The Plaintiffs received a notification of reasons for revocation (prior notice of the decision) as of August 8, 2022, and therefore, the Plaintiffs filed a request for correction

to correct the Patent claims (Claims 1 through 23) as stated in 2. (1) below and in Attachment 2 (the "Correction") on November 11, 2022, which is within the period of submitting a written opinion (number of claims after the correction: 17).
(4) The JPO approved the Correction on March 30, 2023, and made the JPO Decision to the effect "The patent related to Claims 1 and 3 through 18 of Patent No. 6781864 shall be revoked. The opposition to the patent related to Claims 2 and 19 through 23 of Patent No. 6781864 shall be rejected." A certified copy thereof was served upon the Plaintiffs on April 10, 2023.
(5) The Plaintiffs filed this lawsuit to seek rescission of the JPO Decision on May 9, 2023.
2. Details of the Invention
(1) Statements of the patent claims

Claims 1 and 6 that are independent claims from among the claims for the Patent (after the Correction; Claims 2 and 19 through 23 are deleted) are listed below (Claims 3 through 5 and 13 through 18 are claims that cite Claim 1 directly or indirectly and Claims 7 through 18 are claims that cite Claim 6 directly or indirectly; Claim 1 is divided by the Plaintiffs; and Claims 3 through 5 and 7 through 18 are stated in Attachment 2).
[Claim 1]
1A. and 1I. An exposure pellicle film,
which is an exposure pellicle film placed at the opening unit of a support frame, wherein the pellicle film thickness is 200nm or less and the pellicle film is a freestanding film of a carbon nanotube sheet, and
1B. wherein the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes and the bundle diameter is 100nm or less,
1C. wherein the bundles are in-plane oriented in the carbon nanotube sheet,
1D. wherein the following requirements (1) are fulfilled,
1G. wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other, and
1H. wherein the carbon nanotube diameter is 0.8nm or more and 6nm or less.
(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of

the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger.

[Claim 6]

A pellicle film,

which is a freestanding film of a carbon nanotube sheet,

wherein the carbon nanotube diameter is 0.8nm or more and 6nm or less,

wherein the carbon nanotube length is 10μm or more and 10cm or less,

wherein the carbon content in the carbon nanotube is 98 mass percent or more,

wherein the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes,

wherein the bundle diameter is 100nm or less,

wherein the bundles are in-plane oriented in the carbon nanotube sheet and the following requirements (1) are fulfilled, and

wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other.

(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger.

(2) The Description (Exhibit Ko 20) is found to have the following disclosures concerning the Invention.

A. The Invention relates to a photomask or a reticle that is used when a semiconductor device, etc. is manufactured by lithography technology, a pellicle which is a dust-proof cover for a photomask for preventing the adhesion of dust, in particular, the Invention

relates to a pellicle film which is an ultrathin film for extreme ultraviolet (EUV) lithography, a pellicle frame, a pellicle, the manufacturing method thereof, and an original exposure plate using these and the manufacturing method of semiconductor device ([0001]).

B. In lithography, a mask on which a circuit pattern is drawn is irradiated with exposure light, and the circuit pattern is transferred to a semiconductor wafer coated with photoresist. At this moment, if foreign matters, such as dust. etc., adhere to the mask, the shadow of the foreign matters is transferred to the semiconductor wafer, the circuit pattern is not accurately transferred, and the semiconductor wafer becomes a defective product in some cases.

On the other hand, if a pellicle comprised of a support frame to which a pellicle film is affixed is attached to a mask, foreign matters, such as dust, etc., attach to the pellicle film and can be prevented from attaching to the mask. Therefore, the shadow of the foreign matters adhering to the pellicle film is not formed on the semiconductor wafer, and the rejection rate can be significantly reduced ([0002] and [0003]).

C. When the light transmission rate of a pellicle film is low, photoresist formed on the semiconductor wafer is not fully exposed. Therefore, a pellicle film is required to have characteristics to transmit exposure light at a high transmission rate.

When EUV light or other exposure light irradiates a pellicle film, the pellicle film temperature increases during the exposure. For this reason, and also from the perspective of heat dissipation and heat resistance during the temperature increase, a pellicle film with a high EUV transmission rate is required ([0006]).

D. In the past, it was pointed out that if the density was increased to obtain pellicle film strength, a high transmission rate could not be obtained, and that carbon nanotubes had many impurities, such as metals present during the manufacturing process, and had a poor transmission rate ([0008]).

E. Then, the Invention adopted the configuration stated in claims ([0013] through [0015], [0017] through [0019], [0021], [0023], [0024], and [0026] through [0034]).

F. According to the Invention, it is possible to provide a pellicle film, a pellicle frame, and a pellicle having high EUV transmittance and excellent heat resistance. In addition, with an original exposure plate using these items, it is possible to provide an original exposure plate that is capable of forming a miniaturized pattern by EUV light, etc. and capable of performing pattern exposure in which resolution failure due to foreign matters is reduced, and a manufacturing method of a semiconductor device ([0040]).

G. When the R_B value is 0.40 or larger, the bundles are in-plane orientated and when it is less than 0.40, the bundles are not in-plane oriented. It is preferable for the R_B value

to be 0.40 or larger and it is more preferable to be 0.6 or larger ([0104]).
H. A carbon nanotube sheet, in which the bundles are in-plane oriented, can have a film thickness equivalent to the diameter of the bundles, and can achieve a high EUV transmission rate. Further, the carbon nanotube sheet (or the pellicle film) in which the bundles are in-plane oriented can have a network where the bundles are entangled with each other in the in-plane direction, and therefore, can form a freestanding film even if it is not thicker than 100nm ([0112]).

When stress is applied to the carbon nanotube sheet in which the in-plane oriented bundles have a network, the stress can be dispersed, and at the same time, the deformation of the bundles and the translational movement of the bundles can be reduced. Therefore, even when stress is applied to the freestanding film, the network and freestanding film form can be maintained ([0114]).

3. Summary of the reasons for the JPO Decision

(1) Whether to permit the correction

All the Corrections are to restrict the patent claims and fulfill other statutory requirements. Therefore, the Corrections are permitted.

(2) Standard date for determination

There are components of the Invention that are not stated in the base application for which the priority right of the Patent is alleged. Therefore, the priority right effect is not found in the patent application for the Invention and the standard date for determination concerning the novelty, an inventive step, secret prior art, etc. is July 3, 2017, which is the application date of the Patent.

(3) Grounds for revocation of the patent under Article 113, item (ii) of the Patent Act (For more details, see Attachment 3 "Grounds for the JPO Decision.")

The grounds for revocation of the patent subject to the determination in the JPO Decision are as stated below.

(Grounds for revocation)	(Cited document / prior application)	(Claim in question)
Lack of novelty	Cited Document 1	Claims 1 and 3 through 5
Lack of an inventive step	Cited Documents 1 through 3 (Independent primary prior art, respectively)	Claims 1 and 3 through 18
Breach of secret prior art	Prior Application 1	Claims 1, 3 through 5, and 13 through 18

A. Determination on lack of novelty of Inventions 1 and 3 through 5 for which Cited Document 1 is cited as the primary prior art

Inventions 1 and 3 through 5 have no substantial differences with Cited Invention 1 and lack novelty. The patent was granted in violation of Article 29, paragraph (1) of the Patent Act.

B. Determination on lack of an inventive step for which Cited Document 1 is cited as the primary prior art

The Invention could have been easily made by a person ordinarily skilled in the art based on Cited Invention 1 and well-known art. The patent was granted in violation of Article 29, paragraph (2) of the Patent Act.

C. Determination on lack of an inventive step for which Cited Document 2 is cited as the primary prior art

The Invention could have been easily made by a person ordinarily skilled in the art based on Cited Invention 2 and well-known art. The patent was granted in violation of Article 29, paragraph (2) of the Patent Act.

D. Determination on lack of an inventive step for which Cited Document 3 is cited as the primary prior art

The Invention could have been easily made by a person ordinarily skilled in the art based on Cited Invention 3 and well-known art. The patent was granted in violation of Article 29, paragraph (3) of the Patent Act.

E. Determination on secret prior art

Inventions 1, 3, and 4 are identical to Prior Application Invention A, Invention 5 is identical to Prior Application Invention B, Invention 13 is identical to Prior Application Invention C, Inventions 14 through 16 are identical to Prior Application Invention D, and Inventions 17 and 18 are identical to Prior Application Invention E, respectively. The patents were granted in violation of Article 29-2 of the Patent Act.

4. Grounds for rescission

The grounds for rescission in this case are as stated below.

There are no disputes between the parties to this case that the patent application for the Invention has no priority right effect and the standard date for determination concerning the novelty, an inventive step, secret prior art, etc. is the application date of the Patent.

(1) Error in the determination on the novelty for Inventions 1 and 3 through 5 for which Cited Document 1 is cited as the primary prior art (Grounds for Rescission 1)

(2) Error in the determination on an inventive step of the Invention for which Cited Document 1 is cited as the primary prior art (Grounds for Rescission 2)

(3) Error in the determination on an inventive step of the Invention for which Cited Document 2 is cited as the primary prior art (Grounds for Rescission 3)

(4) Error in the determination on an inventive step of the Invention for which Cited Document 3 is cited as the primary prior art (Grounds for Rescission 4)
(5) Error in the determination on the identicalness between Inventions 1, 3 through 5, and 13 through 18 and secret prior art (Grounds for Rescission 5)

No. 4 Judgment of this court
1. Grounds for Rescission 1 and 2 (Error in the determination on the novelty and an inventive step based on Cited Document 1)

The core of the Plaintiffs' arguments stated as Grounds for Rescission 1 and 2 is aggregated into the following two points: since [i] the invention of "freestanding CNT pellicle film" is not stated in Cited Document 1 and [ii] Cited Document 1 contains no statement on the condition of R_B being 0.4 or larger of the Invention, the differences related thereto with Invention 1 are substantive and a person ordinarily skilled in the art could not have easily conceived of bringing in the condition of R_B being 0.4 or larger into Cited Document 1.

This court determines that the Plaintiffs' argument related to [i] cannot be accepted; however, the Plaintiffs' argument [ii] has grounds. A detailed explanation follows below.
(1) Statements in Cited Document 1 (Exhibit Ko 1)

Cited Document 1 is found to have the following disclosures.
A. The Invention relates to EUV lithography imaging using a new pellicle film that is used as a protective film (page 1, title, and summary).
B. With a reflective mask, exposure power is reduced when passing through a pellicle twice (page 1, from the second to the last line from the bottom).

An EUV pellicle is required to have a high average transmission rate, excellent transmission uniformity, and heat-resistance (page 2, lines 18 through 29).
C. There is a new low-density base pellicle based on the integration of carbon nano materials (CNM) in the process flow of SiNx (page 7, from the fourth to the last line from the bottom).

A SiNx layer is formed on both sides of silicon wafer and the back side is square and patterned. After target carbon nano materials are accumulated on the front side of the sample, the back side is etched with KOH solution to remove silicon, and the process selectively stops on the SiNx layer on the sample surface. As a result, a freestanding SiNx/CNM film is produced.

A CNT film is accumulated by dispersing multi-layer CNT powder into a paraffin wax solution and by providing spin coating or spray coating of the solution on the SiNx (page 8, lines 1 through 15).

D. The CNT film achieved approximately 95% of transmission rate. The SEM image shows a thickness of approximately 50nm; however, local thickness varies widely depending on nanotube position. Nanotube diameter is up to 15nm. It is a multi-layer nanotube and suggests that the nanotube layer is comprised of 3 to 4 layers (page 9, lines 9 through 24).

E. It was reported that manufacturing of a stable freestanding CNT film is actually possible (Exhibit Ko 18) (from page 9, fourth line from the bottom to page 10, line 2).

F. A complicated CNT network could be calculated by using a simplified pellicle model (Layer 2 to Layer 10) as an assembly of parallel tubes located in the plane surface and by changing tube diameters and intervals (page 10, lines 5 through 8).

G. The coated layer may be fully freestanding after removing SiNx (page 12, lines 7 and 8). (Note: The underlined part was translated into "完全に自立しているかもしれない (may be fully freestanding)" by the Plaintiffs, while the translation in the JPO Decision is "完全に自立していることができる。(is fully freestanding) ")

H. In FIG. 14, views of PVD coating by Mo (FIG. 14 (a)) and ALD coating by Ru (FIG. 14 (b)) that protect carbon nanotube in EUV + H_2 are shown and the latter is identified to be freestanding.

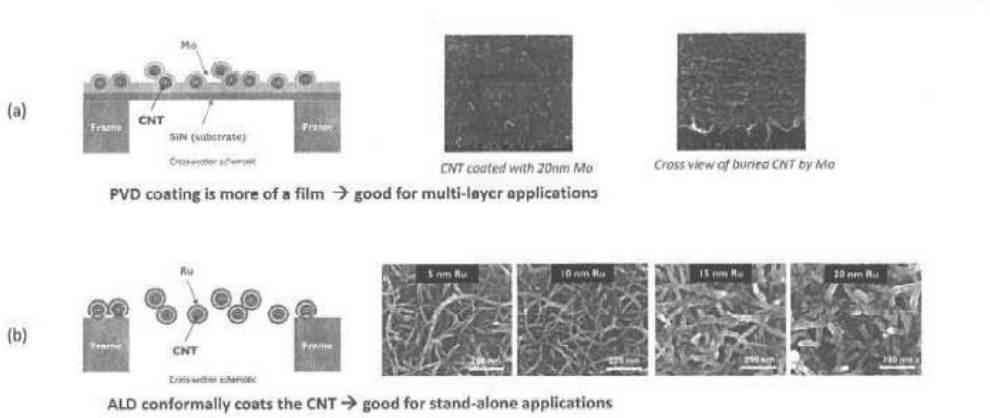


Figure 14. Schematic representation of two coating approaches to protect CNT in EUV+H_2 : (a) PVD coating with Mo, and (b) ALD coating with Ru. In both cases, SEM pictures of experimental deposition results are shown on the right.

FIG. 14 A view of two types of coating methods to protect carbon nanotubes in EUV + H_2. (a) PVD coating by Mo, (b) ALD coating by Ru. In both cases, SEM pictures of experimental deposition results are shown on the right.

(2) Whether Cited Document 1 contains a statement of a "freestanding CNT pellicle film"

As stated in (1) above, in Cited Document 1, transmission rate of a CNT film alone is calculated by deducting the impact of SiNx (page 9, lines 9 through 24, FIG. 10); in the example of producing Ru coated CNT film (FIG. 14 (b)), the technology to use rear

SiN film as a freestanding film after etching is stated; and the CNT freestanding film is well-known art that is stated in Exhibit Ko 18, etc. In light of the above facts, without the need to examine the interpretation of the statements questioned in (1) G. above, a person ordinarily skilled in the art can recognize the configuration of the CNT freestanding film based on Cited Document 1.

The Plaintiffs argued that the technology stated in Exhibit Ko 18 and the technology stated in Cited Document 1 are different in the manufacturing method of the freestanding film. However, Cited Invention 1 is an invention related to a product, and therefore, such difference does not have an impact on the invention's novelty and inventive step.

(3) Whether existence of the condition of R_B being 0.4 or larger is a substantial difference or not

A. Difference 1A ([Difference 1A] in Attachment 3 "Grounds for the JPO Decision," 1. (2) A.) between Invention 1 and Cited Invention 1 found by the JPO Decision includes the point that "configuration of the condition of R_B being 0.4 or larger is not clear in Cited Invention 1." The JPO Decision determined that the difference related to the existence of the condition of R_B being 0.4 or larger is not a substantial difference.

B. However, there is no statement or suggestion to specify the R_B value in Cited Document 1. In addition, it cannot be found that the approach of specifying the in-plane orientation of the CNT film by the R_B value is stated in Cited Document 1 or any other documents available at the time of filing of the application, nor can it be said that such approach was common general technical knowledge at that time.

C. The determination of the JPO Decision as stated in A. above is construed to be based on the following understanding: based on the statements of the Description, etc. that when the R_B value is 0.40 or larger, the bundles are in-plane oriented and when it is less than 0.40, the bundles are not in-plane oriented ([0104]), the condition of R_B being 0.4 or larger of Invention 1 specifies that CNT bundles are in-plane oriented; and since Cited Invention 1 is based on the assumption of in-plane oriented bundles, it fulfills the condition of R_B being 0.4 or larger.

However, in light of the patent claims of Invention 1, the qualitative configuration where CNT bundles are in-plane oriented (Configuration 1C) and the quantitative configuration by the parameter of the condition of R_B being 0.4 or larger (Configuration 1D) are independent. Even based on the statements in [0104] of the Description, etc., it cannot be determined that the condition of R_B being 0.4 or larger is naturally fulfilled even if CNT bundles of Cited Invention 1 have in-plane oriented characteristics.

D. The Defendant argued that any SWCNT with regular characteristics and any

freestanding disorderly thin-film SWCNT sheet that is manufactured in the regularly-used process under regular ideas are considerably more similar to Embodiment 1 than Comparison Example 1 in the Description, etc. from any of the perspectives of the film thickness, bundle diameter, or freestanding characteristics, and also that the R_B value of Comparison Example 1 (0.353) is very close to the lower limit of the condition of R_B being 0.4 or larger, and therefore that, in consideration of these facts, any freestanding disorderly thin-film SWCNT sheet that is considerably more similar to Embodiment 1 than Comparison Example 1 fulfills the condition of R_B being 0.4 or larger.

However, the manufacturing method of "SWCNT with regular characteristics" and a freestanding disorderly thin-film SWCNT sheet that is "manufactured in the regularly-used process under regular ideas" and the "film thickness, bundle diameter, or freestanding characteristics" of the freestanding disorderly thin-film SWCNT sheet as argued by the Defendant are not proved to concretely specify them. Therefore, the details of the "freestanding disorderly thin-film SWCNT sheet that is considerably more similar to Embodiment 1 than Comparison Example 1" are not clear.

According to Exhibit Ko 40 submitted by the Plaintiffs, the R_B values of CNT freestanding films manufactured by the Plaintiffs by the method stated in Cited Document 2 (Samples 1 and 2) are -0.38 and -0.26, respectively. The R_B value of the CNT freestanding film that was manufactured at the time when the Invention was completed was 1.04. Any freestanding disorderly thin-film SWCNT sheet does not always fulfill the condition of R_B being 0.4 or larger.

The Defendant criticized concerning Exhibit Ko 40 as follows: [i] actual storage conditions of R_B measurement samples cannot be confirmed and neither can the existence of the samples; [ii] the embodiment example and the comparison example stated in the Description, etc. are different in experimental conditions; [iii] the R_B measurement samples are not uniform in characteristics in terms of position; [iv] partial breakage is found with Samples 1 and 2 that are considered to fail to fulfill the condition of R_B being 0.4 or larger, and therefore, they are not considered to be freestanding films. However, concerning [i], Samples 1 and 2 are presumed to have been created at the time of the development in April 2017; concerning [ii], since Exhibit Ko 40 describes an experiment to examine "whether an in-plane oriented film with R_B being less than 0.4 exists or not," the experiment does not have to be conducted under conditions of the embodiment example and the comparison example stated in the Description, etc. In addition, concerning [iii], the R_B measurement method is originally applicable to a local cross-section and the condition of R_B being 0.4 or larger refers to the requirement that

the R_B value is to be larger than 0.4 at least at one cross-section, and therefore, the aforementioned determination based on Exhibit Ko 40 is not affected by the points argued by the Defendant. Further, concerning [iv], even if Samples 1 and 2 were partially broken during the manufacturing process in Exhibit Ko 40, the measurement was conducted for films that have become a freestanding film. Therefore, the Defendant's argument cannot be accepted again.

(4) As stated above, the JPO Decision overlooked that Difference 1A, including the condition of R_B being 0.4 or larger, is substantial and contains an error in determining that Inventions 1 and 3 through 5 lack novelty based on Cited Invention 1, and therefore, Grounds for Rescission 1 are well-grounded.

2. Grounds for Rescission 2 (error in the determination of the novelty for which Cited Document 1 is cited as the principal prior art)

(1) The existence or non-existence of the condition of R_B being 0.4 or larger is included in Difference 1A between Invention 1 and Cited Invention 1 and in Difference 6A between Invention 6 and Cited Invention 1 as found in the JPO Decision. However, Cited Document 1 has no statement or suggestion to specify the R_B value, nor can it be found that Cited Document 1 and other documents at the time of filing applications contain any statement to specify in-plane orientation of a CNT film by the R_B value, and it was not common general technical knowledge. As stated above, the Defendant's argument that any freestanding disorderly thin-film SWCNT sheet usually fulfills the condition of R_B being 0.4 or larger cannot be accepted.

(2) Based on the above, in this case where no other secondary prior art has been submitted, a person ordinarily skilled in the art could not have easily conceived of the configuration of Invention 1 related to Difference 1A or the configuration of Invention 6 related to Difference 6A. Therefore, the determination of the JPO Decision, which denied the inventive step of Invention 1 and Invention 6 based on Cited Invention 1, is erroneous.

Inventions 3 through 5 and 7 through 18 cited Invention 1 or Invention 6 and include all configurations of Invention 1 or Invention 6, and therefore, the determination of the JPO Decision, which denied the inventive step of Inventions 3 through 5 and 7 through 18 based on Cited Invention 1, is erroneous.

Consequently, Grounds for Rescission 2 are well-grounded.

3. Grounds for Rescission 3 (error in the determination of the novelty for which Cited Document 2 is cited as the principal prior art)

(1) Statements in Cited Document 2 (Exhibit Ko 2)

Cited Document 2 is found to have the following disclosures.

A. The Invention is, in detail, a carbon nanotube, an oriented single-walled carbon nanotube/bulk structure that achieves non-conventional high purity, high-specific surface area, large scale, and patterning, and their manufacturing method. It relates to a device and application (page 1, lines 4 through 9).

B. As a manufacturing method of a CNT, there is a chemical vapor deposition (CVD) where a carbon source compound comes into contact with metal microparticles that are catalysts at high temperature and a CNT grows. The metal microparticles are placed on a substrate and a CNT grows oriented vertically on the substrate (page 1, lines 14 through 22).

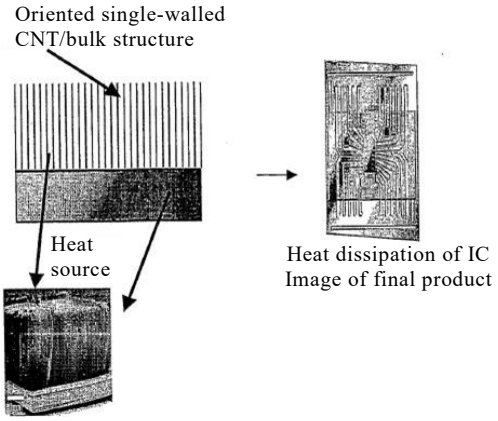
C. Prior art has a problem where a disorderly and non-oriented bulk structure is formed during purification to remove impurities, and the bulk structure of vertically oriented single-walled carbon nanotubes cannot be obtained (page 3, lines 15 through 26).

D. The Invention is characterized by having a metal catalyst in the reaction system and adding an oxidizing agent to the reaction atmosphere (page 21, lines 20 through 22).

E. The oriented single-walled carbon nanotube/bulk structure related to the Invention is comprised of multiple pieces of oriented single-walled carbon nanotubes, can be vertically-oriented on the substrate, and has high purity and large scale (page 26, lines 10 through 25).

F. As application examples of the bulk structure, there are heat dissipators that are used as heat dissipators of various products, such as electronic parts, electric products, optical products, mechanical parts, etc. (page 37, lines 15 through page 38, line 1; FIG. 17), heat transfer units (page 38, lines 2 through 11; FIG. 18), and optical elements (page 39, lines 3 through 18; FIG. 20).

FIG. 17



(2) Based on the above, the error in the findings of Cited Invention 2 and the error in the findings of difference are examined below.

According to (1) F. above, the heat dissipator stated in Cited Document 2 is to release heat generated by an "optical product" and other products by an "oriented single-walled carbon nanotube/bulk structure" (page 37, line 28 through page 38, line 1). The "optical product" and "oriented single-walled carbon nanotube/bulk structure" are different products.

However, in the JPO Decision, Cited Invention 2 is found be a "heat dissipation sheet that is an optical product using an oriented single-walled carbon nanotube/bulk structure" and Cited Invention 2 is found based on the assumption that the "oriented single-walled carbon nanotube/bulk structure" itself is an "optical product," and therefore, said findings are incorrect.

In addition, these incorrect findings are reflected without making any change in the findings of Difference 2A and Difference 2H (concerning the point that Cited Invention 2 is a "heat dissipation sheet that is an optical product using an oriented single-walled carbon nanotube/bulk structure").

This error in findings is related to the technical field and the basic technical meaning of Cited Invention 2 and has an impact on the conclusion of the decision.

(3) Next, the determination on whether a person ordinarily skilled in the art could have easily conceived of the invention is examined.

A. Difference 2A and Difference 2H

In the invention stated in Cited Document 2, a product generating heat (an optical product, etc.) and a "heat dissipator" that releases the heat exist separately. On the other hand, the "pellicle film" that is a "freestanding carbon nanotube sheet" in Invention 1 is a "product generating heat (an optical product, etc.)" as referred to in Cited Document

2 and does not fall under a "heat dissipator."

Therefore, applying the "oriented single-walled carbon nanotube/bulk structure" in Cited Invention 2 as a pellicle film, which does not fall under a "heat dissipator," is an application that is apart from the statements in Cited Document 2, and therefore, it is illogical. In addition, Cited Document 2 has no example nor suggestion of a pellicle film.

Consequently, a person ordinarily skilled in the art could not have easily conceived of the configuration of Invention 1 related to Difference 2A and the configuration of Invention 6 related to Difference 2H in relation to Cited Invention 2.

B. Difference 2D and Difference 2G

The "oriented single-walled carbon nanotube/bulk structure" in Cited Document 2 is comprised of an aggregation of multiple carbon nanotubes standing vertically ((1) B. and E. above). Therefore, even if CNTs of the structure form bundles, it is not assumed that the bundles have been entangled with each other and, as a result, they result in a "network" form.

If bundles are entangled with each other and achieve the condition having a "network," the structure in this condition is no longer an "oriented single-walled carbon nanotube/bulk structure" and is against the problem to be solved as stated in Cited Document 2 to obtain a bulk structure of vertically-oriented single-walled carbon nanotubes. Therefore, there is a disincentive to such application.

(4) As stated above, the JPO Decision contains errors in the findings of Cited Invention 2 and Difference 2A and whether a person ordinarily skilled in the art could have easily conceived of Difference 2A and Difference 2H, and Difference 2D and Difference 2G, and therefore, the determination of the JPO Decision that denied an inventive step in Invention 1 and Invention 6 based on Cited Invention 2 is erroneous.

In addition, Inventions 3 through 5 and 7 through 18 cited Invention 1 or Invention 6 and include all configurations of Invention 1 or Invention 6, and therefore, the determination of the JPO Decision, which denied an inventive step in Inventions 3 through 5 and 7 through 18 based on Cited Invention 2, is erroneous.

Consequently, Grounds for Rescission 3 are well-grounded.

4. Grounds for Rescission 4 (error in the determination on an inventive step of the Invention for which Cited Document 3 is cited as the principal prior art)

The Plaintiffs argued as Grounds for Rescission 4 that [i] the error in the findings of Cited Document 3 and [ii] the error in the determination concerning whether a person ordinarily skilled in the art could have easily conceived of the Invention based on Cited Invention 3. As stated below, this court determines that the Plaintiffs' argument related

to [i] cannot be accepted; however, the Plaintiffs' argument [ii] has grounds.

(1) Statements in Cited Document 3 (Exhibit Ko 3)

Cited Document 3 is found to have the following disclosures.

A. The invention relates to optical elements for a lithography device, a lithography device that is comprised of said optical elements, and a method of manufacturing said optical elements ([0002]).

B. The extreme ultraviolet ray (EUV) source generates EUV irradiation by using the vapors of tin (Sn), etc. If the tin leaks inside the lithography device and accumulates on a mirror in the lithography device over a certain degree, the tin reflects EUV irradiation in the same way as bulk Sn and transmission of the collector significantly decreases as a whole ([0006]).

C. The optical element of the invention ([0061]), wherein the element thickness is approximately between 20nm and 500nm and which has at least approximately 20% transmission under vertical irradiation of EUV (Claim 1, [0010] and [0064]), which, preferably, includes nanotubes that are substantially parallel to the sheet surface ([0061]), for which a support is not always necessary thanks to its strength, which is freestanding ([0011] and [0067]), which is placed as a mask pellicle ([0085]), which includes an EUV transparent material layer and wherein the EUV transparent material layer and nanotube sheet form a laminate ([0068]), wherein the EUV transparent material layer may include one or more elements selected from a group consisting of Be, B, C, Si, P, S, K, Ca, Sc, Sr, Rb, Y, Zr, Nb, Mo, Ru, Rh, Ag, Ba, La, Ce, Pr, Ir, Au, Pa, and U, and in addition, and in particular, it may include B, C, Si, Sr, Sc, Ru, Mo, Y, and Zr, and more in particular, it may include Zr ([0069]), and wherein it is surrounded by an optional holder ([0063]).

D. The oriented carbon nanotube sheet in Cited Invention 3 is freestanding, and excellent and uniform transmission can be performed ([0067]), and is placed as a mask pellicle, thereby making possible to additionally decrease debris from reaching the target and decrease unwanted elements from flowing into the upper stream unit of a mask ([0031] and [0085]).

(2) The Plaintiffs argued that Cited Document 3 does not contain any statement concerning an oriented carbon nanotube sheet that is resistant to application as an EUV pellicle film and that the invention is not stated in a manner to enable a person ordinarily skilled in the art to make an invention that fulfills a "freestanding optical element, including an oriented carbon nanotube sheet, that is placed as a mask pellicle," and therefor that Cited Document 3 cannot be said to describe "an invention that is described in a distributed publication" as set forth in Article 29, paragraph (1), item (iii) of the

Patent Act.

However, a person ordinarily skilled in the art recognizes and understands the optical element related to Cited Invention 3 by taking into account an SWCNT film comprised of a freestanding film (Exhibit Ko 18) that belongs to common general technical knowledge. The film falls under an "oriented carbon nanotube sheet" that can be used as a "mask pellicle" as used in Cited Invention 3. Therefore, it is considered that a person ordinarily skilled in the art can understand the manufacturing method of a freestanding "oriented carbon nanotube sheet" that can be used as a pellicle film in light of the statements in Cited Document 3 and common general technical knowledge. It cannot be said that "an invention that is described in a distributed publication" is not described in Cited Document 3.

The Plaintiffs argued that the freestanding film of SWCNT in Exhibit Ko 18 includes catalytic iron particles and is not resistant to application as EUV pellicle. However, whether it can be resistant to application is not directly specified in the Patent claims. The Plaintiffs' argument is to require matters exceeding the degree necessary for comparison. If catalytic iron particles are impurities that absorb EUV light, it can be said that a person ordinarily skilled in the art understands Cited Invention 3 under conditions where said catalytic iron particles have been removed appropriately (Exhibits Otsu 16 through 18). Therefore, the Plaintiffs' argument cannot be accepted.

Consequently, the Plaintiffs' argument that there is an error in the findings of Cited Invention 3 cannot be accepted.

(3) Next, whether a person ordinarily skilled in the art could have conceived of the invention based on Cited Document 3 is examined.

The existence or non-existence of the condition of R_B being 0.4 or larger is included in Difference 3A between Invention 1 and Cited Invention 3 and in Difference 3D between Invention 6 and Cited Invention 3 as found in the JPO Decision. However, there is no statement or suggestion to identify the R_B value in Cited Document 3.

It is not found that Cited Document 3 and other documents at the time of filing the application contain any statement to specify the in-plane orientation of a CNT film by the R_B value, nor can it be said to be common general technical knowledge. As stated above, the Defendant's argument that any freestanding disorderly thin-film SWCNT sheet usually fulfills the condition of R_B being 0.4 or larger cannot be accepted.

The Defendant argued that if the pellicle film in Cited Invention 3 that is an in-plane oriented film is configured under conditions where the film thickness is reduced to 200nm or less and bundle diameter is set at 100nm or less as in regular cases, it fulfills the condition of R_B being 0.4 or larger. However, the aforementioned Defendant's

argument does not quantitatively specify the relationship between the upper limit of film thickness and bundle diameter and the R_B value. Even in the case of an in-plane oriented film of carbon nanotube where film thickness is 200nm or less and bundle diameter is 100nm or less, in light of the fact that there is a film where the R_B value is not 0.4 or larger (Exhibit Ko 40), it cannot be said that Cited Invention 3 fulfills the condition of R_B being 0.4 or larger by the configuration argued by the Defendant.

(4) Based on the above, a person ordinarily skilled in the art could not have easily conceived of the configuration of Invention 1 related to Difference 3A or the configuration of Invention 6 related to Difference 3D. Therefore, the determination of the JPO Decision, which denied an inventive step in Invention 1 and Invention 6 based on Cited Invention 3 is erroneous.

Inventions 3 through 5 and 7 through 18 cited Invention 1 or Invention 6 and include all configurations of Invention 1 or Invention 6, and therefore, the determination of the JPO Decision, which denied an inventive step in Inventions 3 through 5 and 7 through 18 based on Cited Invention 3 is erroneous.

Consequently, Grounds for Rescission 4 are well-grounded.

5. Grounds for Rescission 5 (Error in the determination on the identicalness between Inventions 1, 3 through 5, and 13 through 18 and secret prior art)

The Plaintiffs argued as Grounds for Rescission 5 that [i] overlooking of the difference related to the configuration that is the core to solve the problem of Prior Application 1: whether a freestanding pellicle film is formed by pressurized bonding (Prior Application Invention A) or by the network (Invention 1) and [ii] the error in the determination in which the JPO did not find the existence of the condition of R_B being 0.4 or larger as a substantial difference. However, as stated below, this court determines that the Plaintiffs' argument related to [i] cannot be accepted, but the Plaintiffs' argument [ii] has grounds.

(1) Statements in Prior Application 1 (Exhibit Ko 19)

Prior Application 1 is found to have the following disclosures.

A. The invention relates to a method to form a carbon nanotube pellicle film for an extreme ultraviolet ray lithography reticle, a method to form a pellicle for extreme ultraviolet ray lithography, and a method to form the reticle system for extreme ultraviolet ray lithography ([0001]).

B. In previous lithography, a pellicle is generally placed on the reticle to protect from contamination of the reticle during handling and exposure ([0003]).

However, there was a problem that previous deep ultraviolet ray (DUV) pellicles absorbed extreme ultraviolet rays excessively and the high energy of extreme ultraviolet

rays tended to damage pellicle film materials ([0005]).

The invention is to provide a pellicle film for extreme ultraviolet ray lithography reticles that makes it possible to provide a pellicle suitable for use with EUVL ([0006]).

C. The invention forms a film that is strengthened by pressurizing an overlapped CNT film ([0007], [0013], and [0089]).

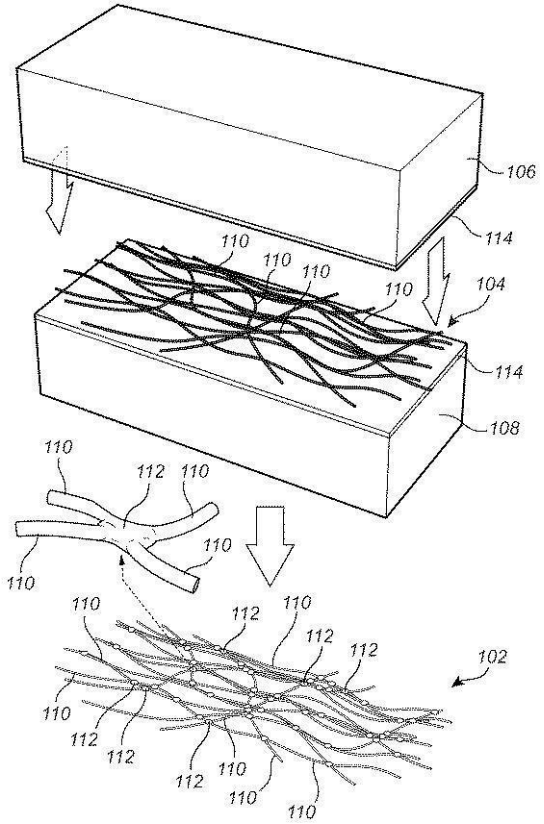
D. Please note that, in the context of the application, the term "CNT film" can refer to the layout of the CNT film that is placed in a way of being connected to CNTs, such as a mesh, web, grid, etc. formed by individual CNTs or bundles of CNTs. Individual CNTs (single-walled CNTs or multi-walled CNTs, and MWCNTs) of each CNT film can be aligned and can form bundles. These bundles of aligned CNTs tend to be formed voluntarily while manufacturing CNT films. Therefore, bonding overlapped CNTs may include connecting overlapped individual CNTs or overlapped CNT bundles together ([0010]).

CNTs or CNT bundles of a CNT film may be placed randomly in a CNT film. However, CNTs or CNT bundles of a CNT film may be placed or aligned in the important or major directions or in multiple major directions ([0011]).

E. The invention forms a freestanding CNT pellicle film that shows relatively high mechanical strength and low EUV light absorption by the freestanding CNT pellicle film and the particle interception or protection characteristics and chemical resistance are increased by bonding between overlapped CNTs ([0022]).

F. In terms of multiple individual CNTs forming bundles (i.e., a thread or rope-like structure), CNTs can be bundled in CNT Film 104, wherein a CNT film is formed by multiple bundles forming an aligned net or by randomly oriented CNT bundles. Therefore, Elements 110 shown in FIG. 1 may refer to CNT bundles alternatively. CNT Bundle 110 may include 2 to 20 pieces of individual CNTs, for example ([0080]).

[FIG. 1]



(2) Difference in whether the freestanding pellicle film is formed by pressurized bonding or by the network

The Plaintiffs argued that the JPO Decision is unjust because it did not include a configuration wherein "overlapped CNTs or crossing CNTs are bonded by pressurizing between two pressurizing surfaces, and thereby forming a freestanding CNT pellicle film," which is the core to solve the problem stated in Prior Application 1.

However, in light of (1) D., F. (FIG. 1) above, it is also found that Prior Application Invention A is also comprised of a "network where the aforementioned in-plane oriented bundles are entangled with each other" (Configuration 1G) in the same way as Invention 1. Even if the bundles of CNTs in Prior Application Invention A are chemically bonded, Configuration 1G of Invention 1 does not eliminate the status where the bundles are entangled with each other, including by chemical bonding. The Plaintiffs' argument on overlooking of the difference in whether being formed by pressurized bonding or by the network is based on the understanding that the forming of a freestanding CNT pellicle film by pressurized bonding of CNTs (Prior Application 1) and the forming of a pellicle film by the network where the aforementioned in-plane oriented bundles are entangled with each other (Invention 1) are in an alternative relationship. However, the Plaintiffs'

argument is unreasonable in its presumption.

(3) The difference related to the condition of R_B being 0.4 or larger

The JPO Decision determined that the phrase in Prior Application Invention A, "CNTs or CNT bundles of a CNT film may be placed or aligned in the important or major directions or in multiple major directions" corresponds to the condition of R_B being 0.4 or larger in Invention 1, but there is no statement or suggestion to specify the R_B value in Prior Application 1. It cannot be found that the approach of specifying the in-plane orientation of a CNT film by the R_B value is stated in Prior Application 1 or any other documents available at the time of filing of the application, nor can it be said that such an approach was common general technical knowledge at that time. Therefore, the aforementioned determination of the JPO Decision lacks grounds.

The Defendant argued as follows: the "freestanding carbon nanotube pellicle film" related to Prior Application Invention A has a thickness of between 5nm and 50nm, consists of SWCNTs with a diameter of between 0.5nm and 2nm, is freestanding, and is not understood to have a special orientation order to manufacture a "CNT film" before pressurizing; and therefore, the "freestanding carbon nanotube pellicle film" falls under a freestanding disorderly thin-film SWCNT sheet; and any freestanding disorderly thin-film SWCNT sheet fulfills the condition of R_B being 0.4 or larger. However, the Defendant's argument does not quantitatively specify the relationship between the thickness and SWCNT diameter and the R_B value of a carbon nanotube freestanding film for which a special orientation order is not granted. The Defendant's argument that any freestanding disorderly thin-film SWCNT sheet usually fulfills the condition of R_B being 0.4 or larger cannot be accepted, as stated above. The Defendant's argument cannot be accepted.

Therefore, Prior Application Invention A is not deemed to be identical to Invention 1.

(4) Based on the above, the JPO Decision that determined that Prior Application Invention A and Invention 1 are identical contains an error.

Since Inventions 3 through 5 and 13 through 16 that cited Invention 1 include the condition of R_B being 0.4 or larger, they are also not identical to Prior Application Inventions A through E and the determination of the JPO Decision is also erroneous in this regard.

6. Conclusion

As mentioned above, Grounds for Rescission 1 through 5 are well grounded, and therefore, the parts related to Claims 1 and 3 through 18 of the JPO Decision are rescinded, and the Judgment is rendered as indicated in the main text.

Intellectual Property High Court, Fourth Division
Presiding judge: MIYASAKA Masatoshi
Judge: MOTOYOSHI Hiroyuki
Judge: IWAI Naoyuki

Attachment 1: List of Abbreviations

(Abbreviation) (Definition)

- The Patent: Patent of Patent No. 6781864 for which the Plaintiffs are the patentees.
- The JPO Decision: The patent revocation decision that the Japan Patent Office made on March 30, 2023 for Opposition No. 2021-700369 related to the Patent (subject to this lawsuit)
- The Correction: The correction of the Patent claims related to the request for correction dated November 11, 2022 filed by the Plaintiffs.
- The Invention: Collective name of inventions related to Claims 1 through 23 of the Patent (those after the Correction).

Claims 2 and 19 through 23 were deleted. These inventions are referred to as "Invention 1", etc. based on the claim number.

- The Description: The description related to the Patent
- Cited Invention 1: Details found by the JPO Decision as the invention stated in Cited Document 1 (Ivan Pollentier, et. al., "EUV Lithography imaging using novel pellicle membranes", Proc. of SPIE Vol. 9776 977620, March 18, 2016; Exhibit Ko 1) (Attachment 3-1 (1))
- Cited Invention 2: Details found by the JPO Decision as the invention stated in Cited Document 2 (International Publication No. 2006/011655) (Attachment 3-3 (1))
- Cited Invention 3: Details found by the JPO Decision as the invention stated in Cited Document 3 (Publication No. of Japanese Translation of PCT International Application 2011-530184) (Attachment 3-4 (1))
- Prior Application 1: Patent Application No. 2018-93909 (Unexamined Patent Application Publication No. 2018-194840; No. of patent application that is considered to be the basis for the allegation of the priority right: 17171172.4; European Patent Office)
- Prior Application Invention: Details found by the JPO Decision as the invention stated in Prior Application 1. They are individually referred to as "Prior Application Invention A" through "Prior Application Invention E" (Attachment 3-5 (1)).
- The condition of R_B being 0.4 or larger: A formula stated as (1) in Claims 1 and 6 of the Patent. In the JPO Decision, it is referred to as "the condition of R_B being 0.40 or larger".
- CNT: Carbon nanotube
- SWCNT: Single-walled carbon nanotube

Attachment 2: Statements in the Claims of the Patent (Excluding Claims 1 and 6)

[Claim 3]

The exposure pellicle film stated in Claim 1,

wherein an additional protective layer in contact with the carbon nanotube sheet is included.

[Claim 4]

The protective layer, which is the exposure pellicle film stated in Claim 3,

wherein one or more elements selected from the group consisting of SiOx (x≦2), SiaNb (a/b is 0.7 to 1.5), SiON, Y_2O_3, YN, Mo, Ru, Rb, Sr, Y, Zr, Nb, B_4C, SiC, or Rh are included.

[Claim 5]

A pellicle comprised of:

the exposure pellicle film stated in any one of Claims 1, 3, and 4, and

a support frame that supports the pellicle film.

[Claim 7]

The pellicle film stated in Claim 6, wherein the ratio of length against the carbon nanotube diameter (length/diameter) is 1×10^4 or more and 1×10^8 or less

[Claim 8]

The pellicle film stated in Claim 6,

wherein an additional protective layer in contact with the carbon nanotube sheet is included.

[Claim 9]

The protective layer, which is the pellicle membrane stated in Claim 8, wherein one or more elements selected from the group consisting of SiOx (x≦2), SiaNb (a/b is 0.7 to 1.5), SiON, Y_2O_3, YN, Mo, Ru, Rb, Sr, Y, Zr, Nb, B_4C, SiC, or Rh are included.

[Claim 10]

A pellicle comprised of:

the pellicle film stated in any one of Claims 6 through 9, and

a support frame that supports the pellicle film.

[Claim 11]

A pellicle frame comprised of:

the pellicle film stated in any one of Claims 6 through 9, and

Frame 1 that supports the pellicle film.

[Claim 12]

A pellicle comprised of:

the pellicle frame stated in Claim 11, and

Frame 2 that is connected to the pellicle frame.

[Claim 13]

An original exposure plate comprised of an original plate and the pellicle that is attached to the surface of the original plate on the side having a pattern and that is stated in Claim 5, 10, or 12.

[Claim 14]

An exposure device comprised of the original exposure plate stated in Claim 13.

[Claim 15]

An exposure device comprised of a light source emitting exposure light, the original exposure plate stated in Claim 13, and an optical system guiding the exposure light that is emitted from the light source to the original exposure plate; wherein the original exposure plate is placed so that the exposure light emitted from the light source passes through the pellicle film and irradiates onto the original plate.

[Claim 16]

The exposure device stated in Claim 15, wherein the exposure light is EUV light.

[Claim 17]

A manufacturing method of a semiconductor device including a step of having exposure light emitted from a light source pass through the pellicle film of the original plate stated in Claim 13 and irradiate the original plate, and thereby having the exposure light reflected by the original plate, and a step of having the exposure light reflected by the original plate pass through the pellicle film and irradiate a sensitive substrate, and thereby having the sensitive substrate exposed in a pattern form.

[Claim 18]

A manufacturing method of the semiconductor device stated in Claim 17, wherein the exposure light is EUV light.

Attachment 3: Grounds for the JPO Decision

1. Lack of novelty based on Cited Invention 1

(1) Findings of the statements in Cited Document 1 (divided by the Plaintiffs)

Cited Document 1 contains the following statements regarding Cited Invention 1.

"1a. and 1g. A CNT pellicle film,

which is a CNT pellicle film placed at the opening unit of a support frame that is used for EUV lithography imaging,

1b. wherein a carbon nano-material-related pellicle CNT film is accumulated on SiNX by spin coating or spray coating,

1c. wherein the CNT pellicle film is fully freestanding after a SiNx film is removed,

1d. wherein a complicated CNT network is placed on a plane surface,

1e. wherein the SWCNT diameter is 1nm to 3nm, and

1f. wherein the CNT is coated by Mo or Ru."

(2) Invention 1

A. Common features and differences between Invention 1 and Cited Invention 1

[Common features]

"An exposure pellicle film,

which is an exposure pellicle film placed at the opening unit of a support frame,

wherein the pellicle film is a freestanding film of a carbon nanotube sheet, and

wherein the carbon nanotube diameter is 0.8nm or more and 6nm or less."

[Difference 1A]

Concerning the carbon nanotube sheet, in Invention 1, "the pellicle film thickness is 200nm or less," "the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes and the bundle diameter is 100nm or less, wherein the bundles are in-plane oriented in the carbon nanotube sheet and the following requirements (1) are fulfilled, wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other," "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches the peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of the carbon nanotube sheet but serves as the baseline, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the baseline in the thickness direction and the diffraction intensity

in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger," while in Cited Invention 1, the configuration is not clear.

B. Whether Difference 1A is substantial or not

Difference 1A is not substantial.

The condition of R_B being 0.4 or larger specifies bundles of an exposure pellicle film as being in-plane oriented. "CNT" bundles of Cited Invention 1 also "places a complicated network on a plane surface" and are in-plane oriented.

(3) Inventions 3 through 5

All the matters specifying the invention of Inventions 3 through 5 conform to those for Cited Invention 1.

2. Lack of an inventive step based on Cited Invention 1

(1) Inventions 1 and 3 through 5

Carbon nanotube-related technology wherein bundles are comprised of multiple carbon nanotubes and the bundle diameter is 100nm or less is well-known art. A carbon nanotube sheet, wherein bundles are in-plane oriented and which has a network where the bundles are entangled with each other, is also well-known art.

It can be said that the condition of R_B being 0.4 or larger specifies that bundles of an exposure pellicle film are in-plane oriented.

Applying the "CNT pellicle film" in Cited Invention 1 as the configuration of the Invention related to Difference 1A by also taking into account well-known art related to CNTs is a matter of design variation that a person ordinarily skilled in the art could have appropriately conceived of.

(2) Invention 6

A. Common features and differences between Invention 6 and Cited Invention 1

[Common features]

"A pellicle film, which is a freestanding film of a carbon nanotube sheet, wherein the carbon nanotube diameter is 0.8nm or more and 6nm or less."

[Difference 1B]

In Invention 6, "the carbon nanotube length is 10μm or more and 10cm or less," and "wherein the carbon content in the carbon nanotube is 98 mass percent or more," while in Cited Invention 1, it is not clear whether the carbon nanotube has these features.

[Difference 1C]

Concerning a carbon nanotube sheet, Invention 6 has the configuration "wherein the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes

and the bundle diameter is 100nm or less, wherein the bundles are in-plane oriented in the carbon nanotube sheet and the following requirements (1) are fulfilled, wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other," "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger," while in Cited Invention 1, the configuration is not clear.

B. Whether the difference could have been easily conceived of by a person ordinarily skilled in the art

(A) A carbon nanotube, which has a length of 10μm or more and 10cm or less, and wherein the carbon content in the carbon nanotube is 98 mass percent or more is well-known art. A pellicle film is required to have heat dissipation and heat-resistance and a carbon nanotube that is used for a pellicle film is required to reduce impurities. These are also well-known problems. Therefore, a person ordinarily skilled in the art could have appropriately applied the aforementioned well-known art to Cited Invention 1.

(B) Difference 1C, like Difference 1A, is not a substantial difference. Or, a person ordinarily skilled in the art could have easily conceived of the configuration of the Invention related to Difference 1C by applying well-known art to Cited Invention 1.

(3) Invention 7, Inventions 8 and 9, Inventions 10 through 12, and Inventions 13 through 18

A person ordinarily skilled in the art could have easily conceived of these inventions based on Cited Invention 1 and well-known art.

3. Lack of an inventive step based on Cited Invention 2

(1) Findings on the statements in the Cited Document 2

Cited Document 2 contains the following statements regarding Cited Invention 2.

"A heat dissipation sheet,

which is an optical product using an oriented single-walled carbon nanotube/bulk

structure and

which is comprised of multiple oriented single-walled carbon nanotubes, wherein the height is 10μm or more and 10cm or less, and

wherein the purity is 98 mass percent or more."

(2) Invention 1

A. Common features and differences between Invention 1 and Cited Invention 2

[Common features]

"A film, which is a carbon nanotube sheet, and

wherein the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes."

[Difference 2A]

Invention 1 is "an exposure pellicle film placed at the opening unit of a support frame," "wherein the thickness is 200nm or less," and "which is a freestanding film of a carbon nanotube sheet," while Cited Invention 2 is "a heat dissipation sheet, which is an optical product using an oriented single-walled carbon nanotube/bulk structure."

[Difference 2B]

In Invention 1, the bundles "have a diameter of 100nm or less," "are in-plane oriented" "in the carbon nanotube sheet," and "requirements (1)" are fulfilled, that is, "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger." However, in Cited Invention 2, these conditions are not clear.

[Difference 2C]

In Invention 1, the carbon nanotube diameter is "0.8nm or more and 6nm or less," while this point is not clear in Cited Invention 2.

[Difference 2D]

In Invention 1, a carbon nanotube sheet "is comprised of a network where the in-

plane oriented bundles are entangled with each other," while such a structure is not clear in Cited Invention 2.

B. Whether the difference could have been easily conceived of by a person ordinarily skilled in the art

(A) A pellicle film, for which the thickness is 200nm or less, including the carbon nanotube sheet, is well-known art.

The "heat dissipation sheet" in Cited Invention 2 is "an optical product using an oriented single-walled carbon nanotube/bulk structure." A pellicle film, including carbon nanotubes, is generally known as a type of heat dissipation sheet that is an optical product.

It is common general technical knowledge that a pellicle film is placed at the opening unit of a support frame. It is also common general technical knowledge that a carbon nanotube sheet is used as a freestanding film.

Then, a person ordinarily skilled in the art could have easily conceived of the configuration of Invention 1 related to Difference 2A by applying well-known art to Cited Invention 2.

(B) A person ordinarily skilled in the art could have easily conceived of the configuration of Invention 1 related to Differences 2B through 2D by applying well-known art to Cited Invention 2.

(3) Invention 6

A. Common features and differences between Invention 6 and Cited Invention 2

[Common features]

"A film, which is a carbon nanotube sheet, wherein the carbon nanotube length is 10μm or more and 10cm or less,

wherein the carbon content in the carbon nanotube is 98 mass percent or more, and

wherein the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes."

[Difference 2E]

In Invention 6, the bundles "have a diameter of 100nm or less," "are in-plane oriented" "in the carbon nanotube sheet," and "requirements (1)" are fulfilled, that is, "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of

the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "RB") is 0.4 or larger." However, in Cited Invention 2, these conditions are not clear.

[Difference 2F]

In Invention 6, the carbon nanotube diameter is "0.8nm or more and 6nm or less," while this point is not clear in Cited Invention 2.

[Difference 2G]

In Invention 6, a carbon nanotube sheet "is comprised of a network where the in-plane oriented bundles are entangled with each other," while such a structure is not clear in Cited Invention 6.

[Difference 2H]

Invention 6 is "a pellicle film," "which is a freestanding film of a carbon nanotube sheet," while Cited Invention 2 is "a heat dissipation sheet, which is an optical product using an oriented single-walled carbon nanotube/bulk structure."

B. Whether the difference could have been easily conceived of by a person ordinarily skilled in the art

A person ordinarily skilled in the art could have easily conceived of the configuration of the Invention 6 related to Differences 2E through 2H by applying well-known art to Cited Invention 2.

(4) A person ordinarily skilled in the art could also have easily conceived of Inventions 3, 4, 8, 9, Inventions 5 and 10 through 12, Invention 7, and Inventions 13 through 18 based on Cited Invention 2 and well-known art.

4. Lack of an inventive step based on Cited Invention 3

(1) Findings on the statements in the Cited Document 3

Cited Document 2 contains the following statements regarding Cited Invention 3.

"An optical element,

wherein the element thickness is approximately between 20nm and 500 nm;

which includes a carbon nanotube sheet, wherein the carbon nanotubes are oriented substantially parallel to the surface of the carbon nanotube sheet;

which is freestanding;

which is placed as a mask pellicle in the lithography device;

which includes an EUV transparent material layer; wherein the EUV transparent

material layer and nanotube sheet form a laminate;

wherein the EUV transparent material layer of the optical element includes one or more elements selected from a group consisting of Be, B, C, Si, P, S, K, Ca, Sc, Sr, Rb, Y, Zr, Nb, Mo, Ru, Rh, Ag, Ba, La, Ce, Pr, Ir, Au, Pa, and U, and in addition, and in particular, it may include B, C, Si, Sr, Sc, Ru, Mo, Y, and Zr, and more in particular, it includes Zr; and

wherein the nanotube sheet is surrounded by an optional holder.

(2) Invention 1

A. Common features and differences between Invention 1 and Cited Invention 3

[Common features]

"An exposure pellicle film,

which is an exposure pellicle film placed at the opening unit of a support frame,

wherein the pellicle film thickness is 200nm or less, and

wherein the pellicle film is a freestanding film of carbon nanotube sheet."

[Difference 3A]

Concerning carbon nanotube sheet, in Invention 1, "the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes and the bundle diameter is 100nm or less, wherein the bundles are in-plane oriented in the carbon nanotube sheet, and the following requirements (1) are fulfilled, and wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other," "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger," while in Cited Invention 3, these conditions are not clear.

[Difference 3B]

In Invention 1, the carbon nanotube diameter is "0.8nm or more and 6nm or less," while this point is not clear in Cited Invention 3.

B. Whether the difference could have been easily conceived of by a person ordinarily skilled in the art

(A) Difference 3A

Carbon nanotube sheets, wherein bundles are comprised of multiple carbon nanotubes and the bundle diameter is 100nm or less, wherein the bundles are in-plane oriented in the carbon nanotube sheet, and which have a network where the bundles are entangled with each other, are well-known art. In addition, the condition of R_B being 0.4 or larger specifies bundles of an exposure pellicle film as being in-plane oriented. However, in Cited Invention 3, "a carbon nanotube is oriented substantially in parallel to the surface of the carbon nanotube sheet."

Consequently, a person ordinarily skilled in the art could have easily conceived of the configuration of Invention 1 related to Difference 3A by applying well-known art to Cited Invention 3.

(B) Difference 3B

A person ordinarily skilled in the art could have easily conceived of the configuration of the Invention 1 related to Difference 3B by applying well-known art to Cited Invention 3.

(3) Invention 6

A. Common features and differences between Invention 6 and Cited Invention 3

[Common features]

"A pellicle film,

which is a freestanding film of a carbon nanotube sheet."

[Difference 3C]

In Invention 6, "the carbon nanotube diameter is 0.8nm or more and 6nm or less and the carbon nanotube length is 10μm or more and 10cm or less, wherein the carbon content in the carbon nanotube is 98 mass percent or more," while in Cited Invention 3, it is not clear whether the carbon nanotube has such features.

[Difference 3D]

Concerning a carbon nanotube sheet, in Invention 6, "the carbon nanotube sheet is comprised of bundles made up of multiple carbon nanotubes and the bundle diameter is 100nm or less, wherein the bundles are in-plane oriented in the carbon nanotube sheet and the following requirements (1) are fulfilled, and wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other," "(1) In a selected area electron diffraction image of the cross-section of a carbon nanotube sheet, the ratio calculated by dividing the difference between the diffraction intensity in the reciprocal lattice vector that reaches a peak of the diffraction intensity

derived from the triangular lattice of the carbon nanotube bundles in the thickness direction of the carbon nanotube sheet, and the diffraction intensity in the reciprocal lattice vector that does not reach the aforementioned peak in the thickness direction of the carbon nanotube sheet but serves as the base line, by the difference between the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that serves as the base line in the thickness direction and the diffraction intensity in the in-plane direction of the carbon nanotube sheet in the reciprocal lattice vector that reaches the peak of the diffraction intensity in the thickness direction (the ratio is referred to as "R_B") is 0.40 or larger," while in Cited Invention 3, these conditions are not clear.

B. Whether the difference could have been easily conceived of by a person ordinarily skilled in the art

(A) Difference 3C

The configurations related to Difference 3C are all well-known art.

Consequently, a person ordinarily skilled in the art could have easily conceived of the configuration of the Invention 6 related to Difference 3C by applying well-known art to Cited Invention 3.

(B) Difference 3D

In the same way as Difference 3A, a person ordinarily skilled in the art could have easily conceived of the configuration of Invention 6 related to Difference 3D by applying well-known art to Cited Invention 3.

(4) Inventions 3, 4, 8, and 9, and Inventions 5, 10 through 12, 7, and 13 through 18

A person ordinarily skilled in the art could have easily conceived of these inventions based on Cited Invention 3 and well-known art.

5. Secret prior art

(1) Findings on the statements in Prior Application 1

The following Prior Application Inventions A through E are stated in Prior Application 1.

(Prior Application Invention A)

"A freestanding carbon nanotube pellicle film for an extreme ultraviolet ray lithography reticle, which is suspended by the edge of a frame, such as a pellicle frame;

wherein the CNT pellicle film thickness is between 5nm and 50nm;

wherein the CNT pellicle film can be formed by pressurizing a CNT film;

wherein the CNT film is formed by multiple bundles that form an aligned net;

wherein the CNT bundles may include, for example, 2 to 20 pieces of individual CNTs;

wherein the CNTs or CNT bundles of a CNT film can be placed or aligned in the important or major directions or in multiple major directions ([0011]).

Wherein the CNT film can be formed with SWCNTs, which have a diameter between 0.5nm and 2nm;

wherein the CNT film is placed in a way of being connected to CNTs, such as a mesh, web, grid, etc. formed by bundles of CNTs;

wherein the coating includes one or more elements selected from a group consisting of B, B4C, ZrN, Mo, Ru, SiC, TiN, and a-C on the carbon nanotube film."

(Prior Application Invention B)

"A pellicle that includes the freestanding carbon nanotube pellicle film stated in Prior Application Invention A and the pellicle frame that secures the carbon nanotube pellicle film."

(Prior Application Invention C)

"A reticle system where the pellicle stated in Prior Application Invention B is attached on the reticle."

(Prior Application Invention D)

"An extreme ultraviolet ray lithography device that manufactures semiconductors, wherein the patterns on the reticle can be transferred to a layer sensitive to EUV radiation by illuminating EUV radiation to a reticle of the reticle system stated in Prior Application Invention C; wherein EUV light is modulated by a reticle pattern; and wherein the pattern is formed on a wafer on which photoresist is coated."

(Prior Application Invention E)

"An extreme ultraviolet ray lithography that manufactures semiconductors, wherein patterns on the reticle can be transferred to a layer sensitive to EUV radiation by illuminating EUV radiation to a reticle of the reticle system stated in Prior Application Invention C; wherein EUV light is modulated by a reticle pattern; and wherein the pattern is formed on a wafer on which photoresist is coated."

(2) Invention 1

Invention 1 is identical to Prior Application Invention A.

"'Wherein CNTs or CNT bundles of a CNT film can be placed or aligned in the important or major directions or in the multiple major directions,' 'wherein the CNT film is placed in a way of being connected to CNTs, such as a mesh, web, grid, etc. formed by bundles of CNTs'" in Prior Application Invention A corresponds to "wherein the carbon nanotube sheet is comprised of a network where the in-plane oriented bundles are entangled with each other" in Invention 1.

The condition of R_B being 0.4 or larger is found to specify that bundles of exposure

pellicle films are in-plane oriented. Therefore, "wherein CNTs or CNT bundles of a CNT film can be placed or aligned in the important or major directions or in the multiple major directions" in Prior Application Invention A corresponds to " the in-plane oriented bundles are entangled with each other in the carbon nanotube sheet, and the following requirements (1) are fulfilled" (requirements (1) correspond to the condition of R_B being 0.4 or larger) in Invention 1.

(3) Inventions 3 and 4, Invention 5, Invention 13, Inventions 14 through 16, and Inventions 17 and 18

Inventions 3 and 4 are identical to Prior Application Invention A, Invention 5 is identical to Prior Application Invention B, Invention 13 is identical to Prior Application Invention C, Inventions 14 through 16 are identical to Prior Application Invention C, and Inventions 17 and 18 are identical to Prior Application Invention E, respectively.