

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

SEOUL SEMICONDUCTOR CO., LTD., a)	
Korean corporation, SEOUL VIOSYS CO.,)	
LTD., a Korean corporation,)	
)	
Plaintiffs,)	
)	
v.)	C.A. No. _____
)	
GE HEALTHCARE INC.,)	DEMAND FOR JURY TRIAL
)	
Defendant.)	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs Seoul Semiconductor Co., Ltd. (“Seoul Semiconductor”) and Seoul Viosys Co., Ltd. (“Seoul Viosys”) (collectively, the “Seoul Plaintiffs”), for their Complaint against Defendant GE Healthcare Inc. (“GEHC” or “Defendant”), allege as follows:

NATURE OF THE ACTION

1. The Seoul Plaintiffs bring this patent infringement action to protect their valuable patented technology relating to light emitting diodes (“LEDs”) and LED lighting. An LED is a semiconductor device that converts electrical energy into light. LEDs have many advantages over conventional light sources, including lower energy consumption, longer lifetime, and smaller size.

2. Seoul Semiconductor was founded in 1992 with approximately 30 employees in a small space of a commercial building in Bongchen-dong, Seoul, Korea. From those initial 30 employees, Seoul Semiconductor has grown into one of the largest manufacturers of LEDs in the world. Its subsidiary, Seoul Viosys, is also a leading company in the LED industry.

3. The Seoul Plaintiffs’ success is in large part due to their significant investment in innovation and respect for intellectual property. Seoul Semiconductor has invested in research and development (“R&D”) for decades. Seoul Semiconductor invests over 10% of sales revenue into

R&D and owns one of the largest LED patent portfolios in the world, which includes more than 10,000 patents worldwide.

THE PARTIES

4. Plaintiff Seoul Semiconductor is a company organized and existing under the laws of the Republic of Korea, with its principal place of business at 1B-25, 727, Wonsi-dong, Danwon-gu, Ansan-city, Gyeonggi-do, Korea 425-851.

5. Plaintiff Seoul Viosys is a company organized and existing under the laws of the Republic of Korea, with its principal place of business at 65-16, Sandan-ro 163 beon-gil, Danwon-gu, Ansan-city, Gyeonggi-do, Korea 425-851. Seoul Viosys is a subsidiary of Seoul Semiconductor.

6. Defendant GEHC is a corporation organized and existing under the laws of Delaware, having a principal place of business at 500 W Monroe St, Chicago, Illinois, 60661.

JURISDICTION AND VENUE

7. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a) because, at the very least, this action arises under the patent laws of the United States, including 35 U.S.C. § 271 *et seq.*

8. This Court has personal jurisdiction over GEHC because it is a corporation organized and existing under the laws of the State of Delaware.

9. Venue is proper within this judicial district under 28 U.S.C. §§ 1391(b) and 1400(b) because GEHC has committed acts of infringement in this district and because GEHC is a corporation organized and existing under the laws of the State of Delaware and therefore resides in this district.

PATENTS-IN-SUIT

10. Seoul Viosys is the lawful owner of all right, title, and interest in United States Patent No. 10,418,514 entitled “Light emitting diode and method of fabricating the same” (“the ’514 patent”), including the right to sue and to recover for infringement thereof. The ’514 patent was duly and legally issued on September 17, 2019, by the United States Patent and Trademark Office to Kim *et al.* A copy of the ’514 patent is attached hereto as Exhibit A.

11. Seoul Semiconductor is the lawful owner of all right, title, and interest in United States Patent No. 8,604,496 entitled “Optical semiconductor device” (“the ’496 patent”), including the right to sue and to recover for infringement thereof. The ’496 patent was duly and legally issued on December 10, 2013, by the United States Patent and Trademark Office to Shioda *et al.* A copy of the ’496 patent is attached hereto as Exhibit B.

12. Seoul Semiconductor is the lawful owner of all right, title, and interest in United States Patent No. 7,667,225 entitled “Light emitting device” (“the ’225 patent”), including the right to sue and to recover for infringement thereof. The ’225 patent was duly and legally issued on February 23, 2010, by the United States Patent and Trademark Office to Lee *et al.* A copy of the ’225 patent is attached hereto as Exhibit C.

13. Seoul Viosys is the lawful owner of all right, title, and interest in United States Patent No. 10,193,020 entitled “Semiconductor light emitting device and method of manufacturing the same” (“the ’020 patent”), including the right to sue and to recover for infringement thereof. The ’020 patent was duly and legally issued on January 29, 2019, by the United States Patent and Trademark Office to Lee *et al.* A copy of the ’020 patent is attached hereto as Exhibit D.

14. Seoul Viosys is the lawful owner of all right, title, and interest in United States Patent No. 8,791,483 entitled “High efficiency light emitting diode and method for fabricating the same” (“the ’483 patent”), including the right to sue and to recover for infringement thereof. The ’483 patent was duly and legally issued on July 29, 2014, by the United States Patent and Trademark Office to Ye *et al.* A copy of the ’483 patent is attached hereto as Exhibit E.

15. Seoul Viosys is the lawful owner of all right, title, and interest in United States Patent No. 10,672,952 entitled “Light emitting diode for surface mount technology, method of manufacturing the same, and method of manufacturing light emitting diode module” (“the ’952 patent”), including the right to sue and to recover for infringement thereof. The ’952 patent was duly and legally issued on June 2, 2020, by the United States Patent and Trademark Office to Chae *et al.* A copy of the ’952 patent is attached hereto as Exhibit F.

16. Seoul Semiconductor is the lawful owner of all right, title, and interest in United States Patent No. 9,293,664 entitled “Wafer-level light emitting diode package and method of fabricating the same” (“the ’664 patent”), including the right to sue and to recover for infringement thereof. The ’664 patent was duly and legally issued on March 22, 2016, by the United States Patent and Trademark Office to Seo *et al.* A copy of the ’664 patent is attached hereto as Exhibit G.

17. Seoul Viosys is the lawful owner of all right, title, and interest in United States Patent No. 8,648,369 entitled “Light emitting device and method of fabricating the same” (“the ’369 patent”), including the right to sue and to recover for infringement thereof. The ’369 patent was duly and legally issued on February 11, 2014, by the United States Patent and Trademark Office to Seo *et al.* A copy of the ’369 patent is attached hereto as Exhibit H.

18. Seoul Viosys is the lawful owner of all right, title, and interest in United States Patent No. 7,982,234 entitled “Light emitting device and method for fabricating the same” (“the ’234 patent”), including the right to sue and to recover for infringement thereof. The ’234 patent was duly and legally issued on July 19, 2011, by the United States Patent and Trademark Office to Seo *et al.* A copy of the ’234 patent is attached hereto as Exhibit I.

19. The above referenced patents are collectively referred to herein as the “Seoul LED Patents.”

BACKGROUND

20. On or about October 24, 2022, the Seoul Plaintiffs’ counsel sent a letter to GEHC’s Chief Executive Officer, Peter J Arduini, notifying him that GEHC was manufacturing and selling LED products that they believed to infringe their patent rights. The letter included an example of an infringing product and patents, including the ’514 Patent, ’496 Patent, ’225 Patent, ’020 Patent, ’483 Patent, ’952 Patent, ’664 Patent, and ’369 Patent.

21. On November 2, 2022, counsel for GE sent a letter acknowledging receipt of the Seoul Plaintiffs’ October 24 letter.

22. On information and belief Plaintiff is aware of the ’234 Patent since at least as of the filing of this Complaint.

23. Accordingly, based on the above, and on information and belief, GEHC has been aware of its infringement of the Seoul LED Patents.

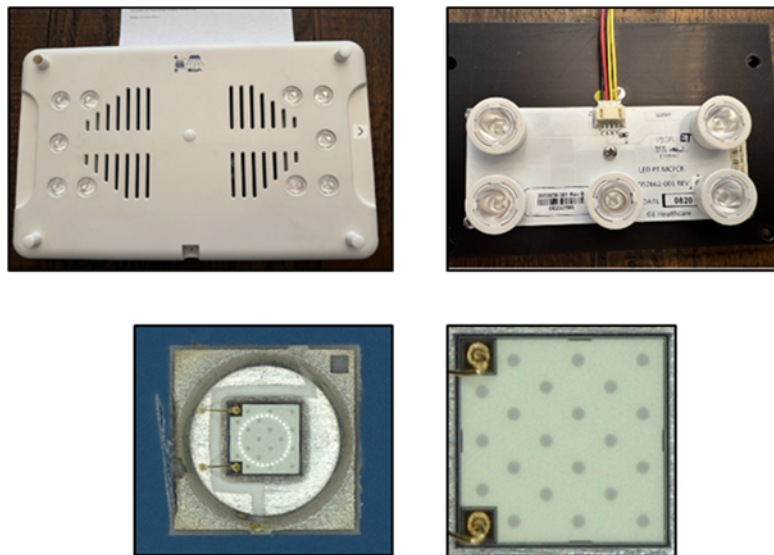
24. The Seoul Plaintiffs have marked their patented products virtually in accordance with 35 U.S.C. § 287.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 10,418,514
EXEMPLARY CLAIM 14

25. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 24 as though fully set forth herein.

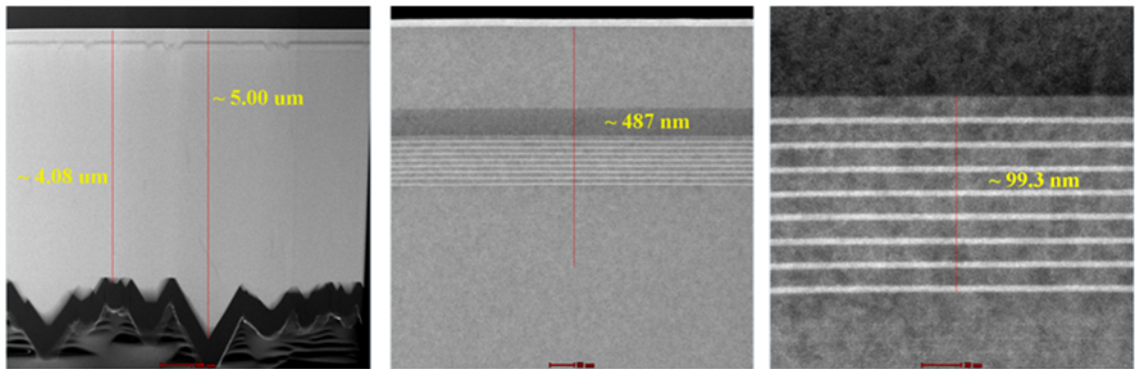
26. GEHC has infringed and continues to infringe one or more claims of the '514 patent, including but not limited to exemplary claim 14, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

27. The GE Healthcare Lullaby LED Phototherapy System includes a light emitting diode ("LED"). The images of an LED from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The image top left below depicts the GE Healthcare Lullaby LED Phototherapy System device. The image top right below is an LED module with 5 LED packages extracted from the device. The image bottom left below is the LED package, and the image bottom right below is an LED chip removed from the LED package.



28. The images below are transmission electron microscope ("TEM") images created from a slice of the LED chip. The image below left includes the entire epitaxial structure. The

image below center enlarges the region above and below the active region. The region below the active region includes an n-type contact layer, the region above the active region includes a p-type contact layer. The image below right enlarges the active region, showing relatively thin and bright multi-quantum well layers and relatively thick and dark barrier layers are alternatively stacked.



29. A number of layers are depicted in the image above center both above and below the active region. Those layers include a p-type clad layer between the p-type contact layer and the active region and a spacer layer disposed over the n-type contact layer. The spacer layer has a bandgap smaller than the barrier layer and greater than the quantum well layer.

30. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

31. GEHC's infringement has occurred with knowledge of the '514 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

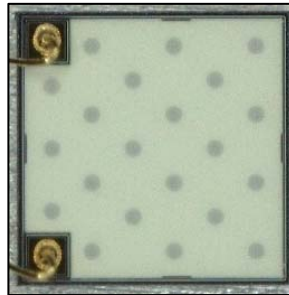
32. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 8,604,496
EXEMPLARY CLAIM 1

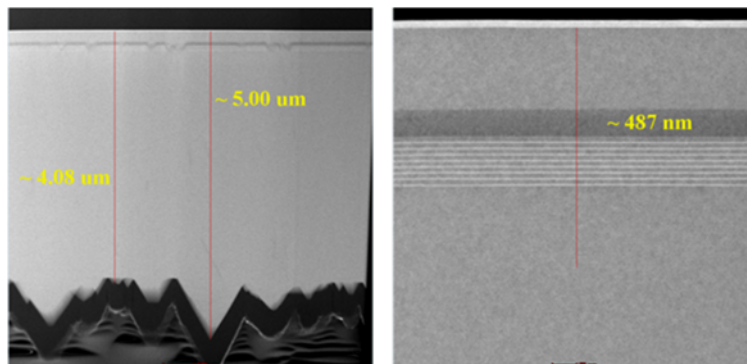
33. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 32 as though fully set forth herein.

34. GEHC has infringed and continues to infringe one or more claims of the '496 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

35. The GE Healthcare Lullaby LED Phototherapy System includes a plurality of LED chips. An optical image of an LED chip from the GE Healthcare Lullaby LED Phototherapy System is shown below.

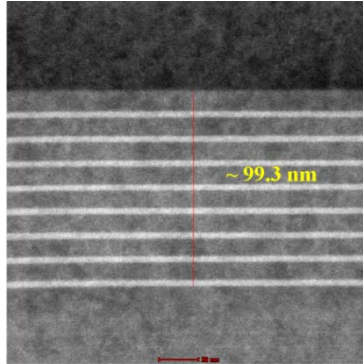


36. The images below are two TEM images created from a thin section taken from the LED chip. The image below left shows the entire epitaxial structure. The image below right is a higher resolution image focused on the light emitting region.



37. The layer structure in the image above right includes, in relevant part from bottom to top, an n-type semiconductor layer, a functional part, and a p-type semiconductor layer.

38. The image below is a TEM image focused on the functional part, which includes a plurality of active layers stacked in a direction from the lower n-type semiconductor layer toward the upper p-type semiconductor layer.



39. The above depicted functional part includes multiple active layers that include a multilayer stacked body including a plurality of thick film layers and a plurality of thin film layers alternately stacked in the direction. The thin film layers appear as relatively bright and thin layers (wells) separated by relatively thick dimmer layers (barriers). A multilayer stacked body can include, for example, a pair of wells and three surrounding barrier layers.

40. Within the overall structure, the active layer includes an n-side barrier layer provided between the multilayer stacked body and the p-type semiconductor layer, a well layer; and a p-side barrier layer provided between the well layer and the p-type semiconductor layer. With that arrangement, the well layer is provided between the n-side barrier layer and the p-side barrier layer.

41. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

42. GEHC's infringement has occurred with knowledge of the '496 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

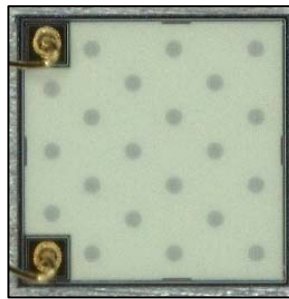
43. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 7,667,225
EXEMPLARY CLAIM 1

44. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 43 as though fully set forth herein.

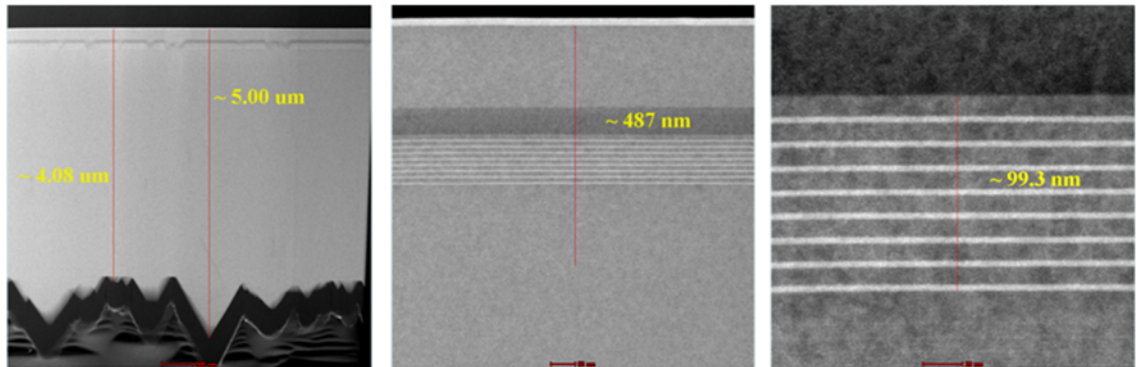
45. GEHC has infringed and continues to infringe one or more claims of the '225 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

46. The GE Healthcare Lullaby LED Phototherapy System includes a plurality of LED chips. An optical image of an LED chip from the GE Healthcare Lullaby LED Phototherapy System is shown below.



47. Below are three TEM of the epitaxial structure of the LED chip. The image to the left shows the entire epitaxial structure. The image below center enlarges the region of the epitaxial structure around the multi-quantum well active layer. The image below right enlarges the multi-quantum well. The LED chip includes from bottom to top in relevant part an n-type semiconductor

layer, a multi-quantum well structure, and a p-type semiconductor layer. The multi-quantum well structure comprises brightly colored wells separated by darker barriers.



48. The well layers within the multi-quantum well structure include indium. In addition, the concentration of indium varies across the layer, with areas of relatively high indium concentration transitioning to areas of lower indium concentration. The regions of relatively higher indium concentration correspond to carrier trap portions. And the transition from relatively lower to relatively higher indium concentration corresponds to a related drop in the band-gap energy.

49. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

50. GEHC's infringement has occurred with knowledge of the '225 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

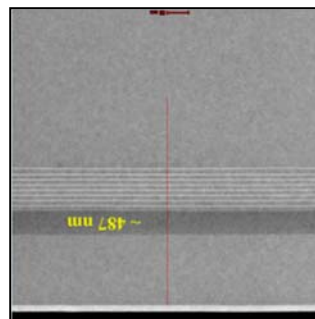
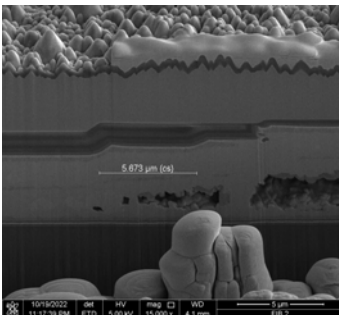
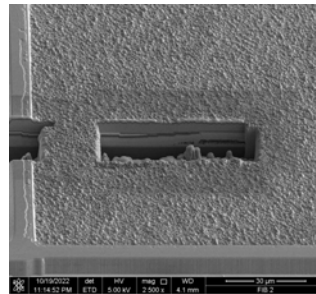
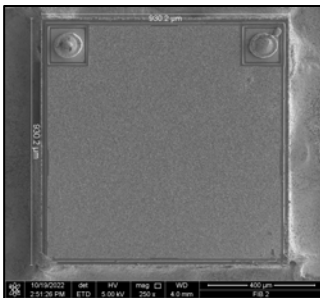
51. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 10,193,020
EXEMPLARY CLAIM 1

52. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 51 as though fully set forth herein.

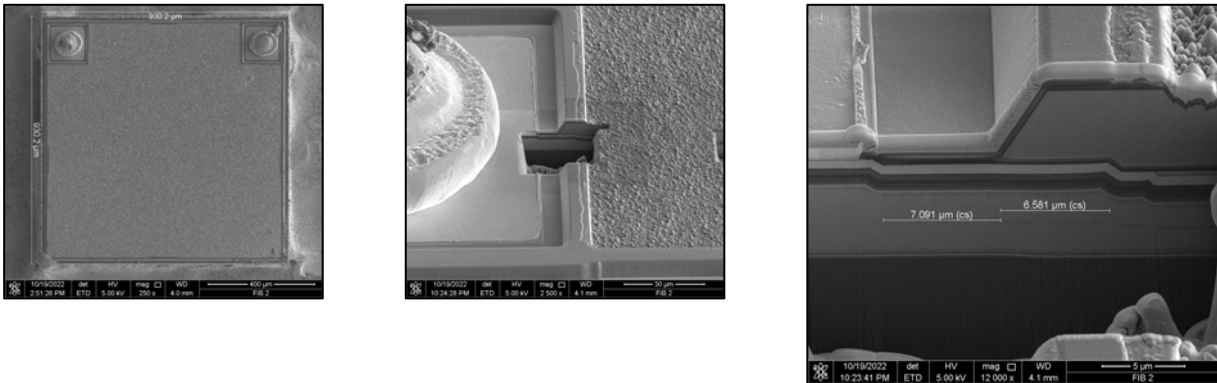
53. GEHC has infringed and continues to infringe one or more claims of the '020 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

54. Four images of an LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is a scanning electron microscope ("SEM") image of the top surface of the LED chip. The other three images below are SEM and TEM images created after the creation of a hole in the LED chip using a focused ion beam ("FIB").



55. The bottom left image above is an image showing the layer structure within the FIB-created hole, including a mesa region. The bottom right image above is an enlarged view of the layer structure around the active layer. The LED chip includes a first conductive type nitride semiconductor layer, an active layer disposed under the first conductive type nitride semiconductor layer, a second conductive type nitride semiconductor layer disposed under the active layer, and mesa regions disposed upward from the second conductive type nitride semiconductor layer so as to expose the first conductive type nitride semiconductor layer.

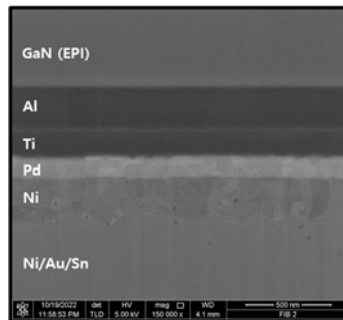
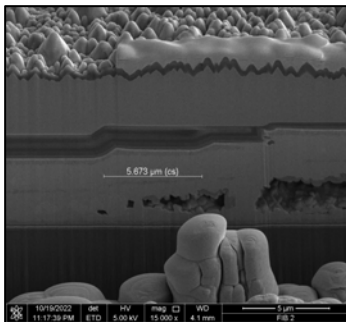
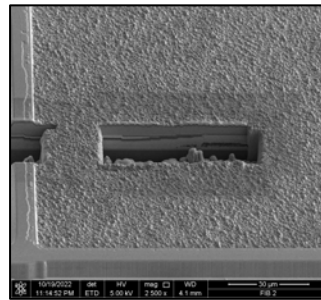
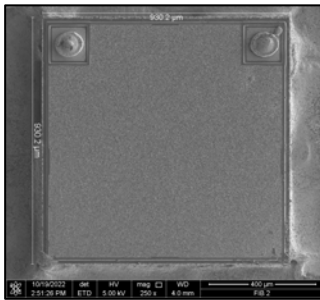
56. Three additional images of the LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The left image below is an image of the top surface of the LED chip. The other two images below are images created after the creation of a hole in the LED chip using FIB.



57. The right image shows a second electrode disposed under the second conductive type nitride semiconductor layer, a cover metal layer disposed at a corner under the second conductive type nitride semiconductor layer so as to overlap a part of the second electrode, and partially exposed in the upward direction, an insulating layer disposed under the cover metal layer,

the second electrode, and the mesa regions, and a second electrode pad disposed over the exposed cover metal layer.

58. Four additional images of the LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is a SEM image of the top surface of the LED chip. The other three images below are SEM images created after the creation of a hole in the LED chip using FIB.



59. The bottom left image above is an image showing the layer structure within the FIB-created hole. The bottom right image above is an enlarged view of the layer structure. The LED chip includes openings of the insulating layer, disposed at portions corresponding to the mesa regions so as to expose the first conductive type nitride semiconductor layer, a first electrode disposed under the insulating layer and in the openings, and a conductive substrate disposed under the first electrode. Additionally, when a first width of the second electrode between one mesa region of the mesa regions and another mesa region adjacent to the mesa region is represented by

a and a second width of the second electrode between a mesa region at an edge and an extension line of the cover metal layer at the corner is represented by b, a relation of $a > b$ is established.

60. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

61. GEHC's infringement has occurred with knowledge of the '020 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

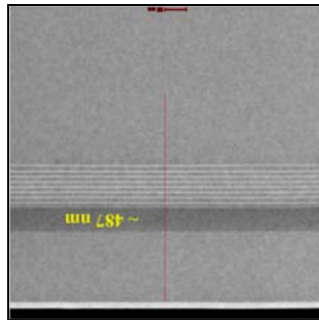
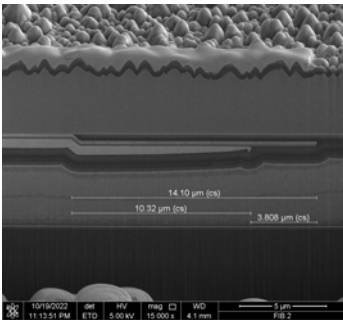
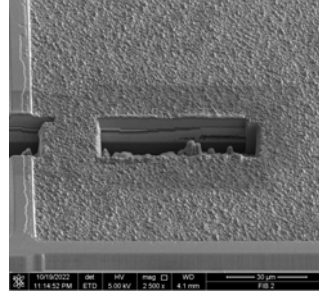
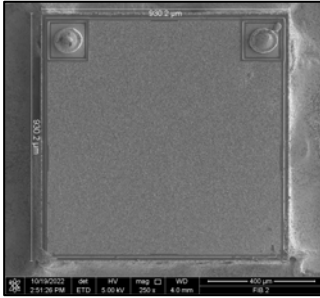
62. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 8,791,483
EXEMPLARY CLAIM 1

63. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 62 as though fully set forth herein.

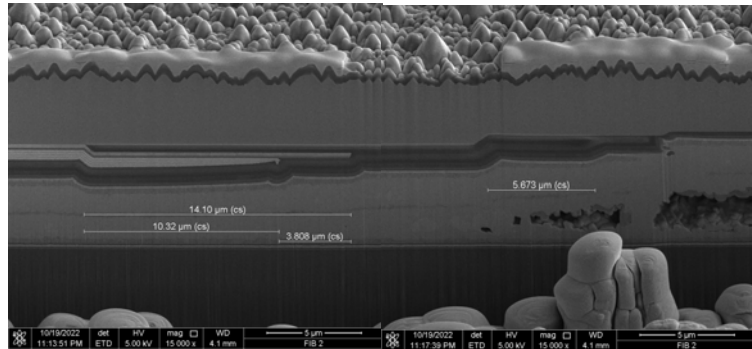
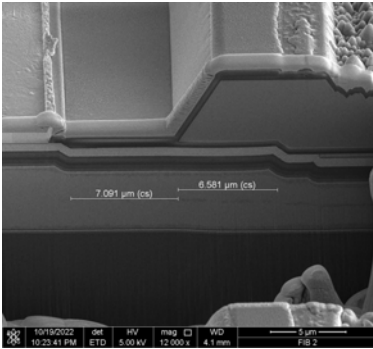
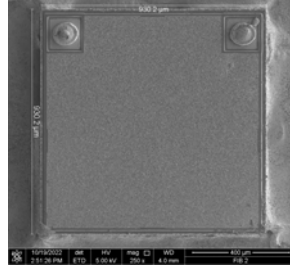
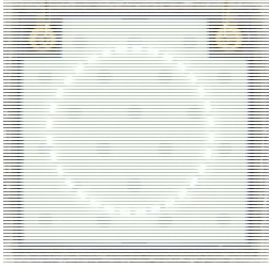
64. GEHC has infringed and continues to infringe one or more claims of the '483 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

65. Four images of an LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is an image of the top surface of the LED chip. The other three images below are SEM and TEM images created after the creation of a hole in the LED chip using FIB.



66. The bottom left image above is an image showing the layer structure within the FIB-created hole. The bottom right image above is an enlarged view of the layer structure around the active layer. The LED chip includes a support substrate, a semiconductor stack disposed on the support substrate, the semiconductor stack comprising a first compound semiconductor layer having an upper surface and comprising first protrusions disposed on the upper surface, a second compound semiconductor layer, and an active layer disposed between the first compound semiconductor layer and the second compound semiconductor layer.

67. Four additional images of the LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top images below are images of the top surface of the LED chip. The bottom images below are images created after the creation of a hole in the LED chip using FIB.



68. The bottom left and bottom right images show the layer structures within FIB created holes in the top two images. The LED chip includes at least one opening that extends through the second compound semiconductor layer and the active layer, and exposes a portion of the first compound semiconductor layer, the portion facing the substrate, an insulating layer disposed on the exposed portion of the first compound semiconductor layer and a sidewall of the at least one opening, an electrode structure electrically connected to the second compound semiconductor layer and extending outside of the semiconductor stack, and an electrode pad disposed the outside of the semiconductor stack and on the electrode structure.

69. GEHC’s infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

70. GEHC’s infringement has occurred with knowledge of the ’483 patent and knowledge that its acts constitute infringement. GEHC’s continuing conduct, therefore, is willful.

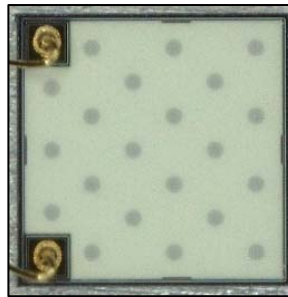
71. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 10,672,952
EXEMPLARY CLAIM 1

72. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 71 as though fully set forth herein.

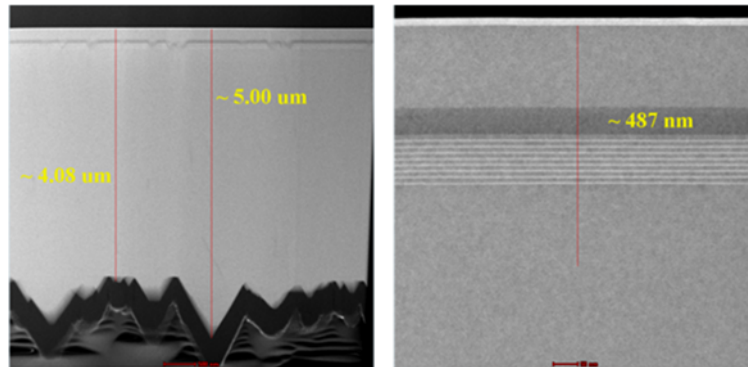
73. GEHC has infringed and continues to infringe one or more claims of the '952 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

74. The GE Healthcare Lullaby LED Phototherapy System includes a plurality of LED chips. An optical image of an LED chip from the GE Healthcare Lullaby LED Phototherapy System is shown below.

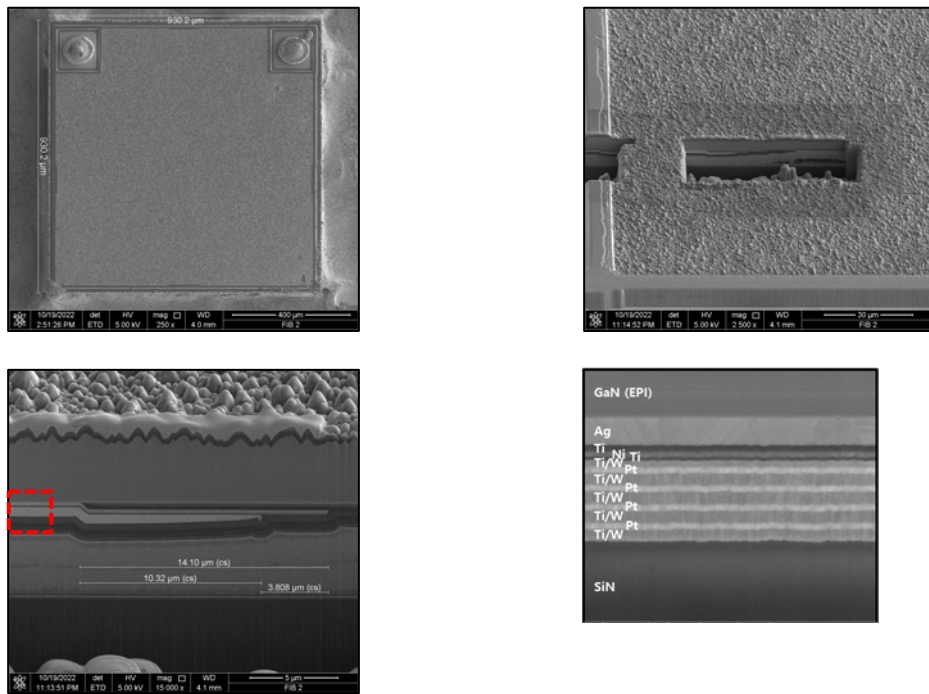


75. The images below are two TEM images created from a thin section taken from the LED chip. The image below left shows the entire epitaxial structure. The image below right is a higher resolution image focused on the active layer. The layer structure in the image below right includes, in relevant part from bottom to top, a first conductive type (n-type) semiconductor layer, an active layer, and a second conductive type (p-type) semiconductor layer. The active layer is disposed between the first conductive type semiconductor layer and the second conductive type

semiconductor layer and is operable to emit light in response to an electrical current through the layer structure.



76. Four images of the LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is a SEM image of the top surface of the LED chip. The other three images below are SEM images created after the creation of a hole in the LED chip using FIB. Since the LED chip has a vertical structure, the semiconductor layers in the SEM images are shown opposite to the TEM images above.



77. The bottom left image above is a SEM images showing the layer structure within the FIB-created hole. The bottom right image above is an enlarged view of the layer structure under the semiconductor layers including a reflection structure, barrier layer and insulation layer. The LED chip includes a reflection structure disposed on a p-type semiconductor layer and is configured to reflect light emitted by the light emitting structure. The LED chip also includes an insulation layer disposed over the p-type semiconductor layer. The LED chip also includes a barrier layer disposed over the second conductive type semiconductor layer and the reflection structure, the barrier layer structured to include conductive materials and to prevent a diffusion of the metal in the reflection structure.

78. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

79. GEHC's infringement has occurred with knowledge of the '952 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

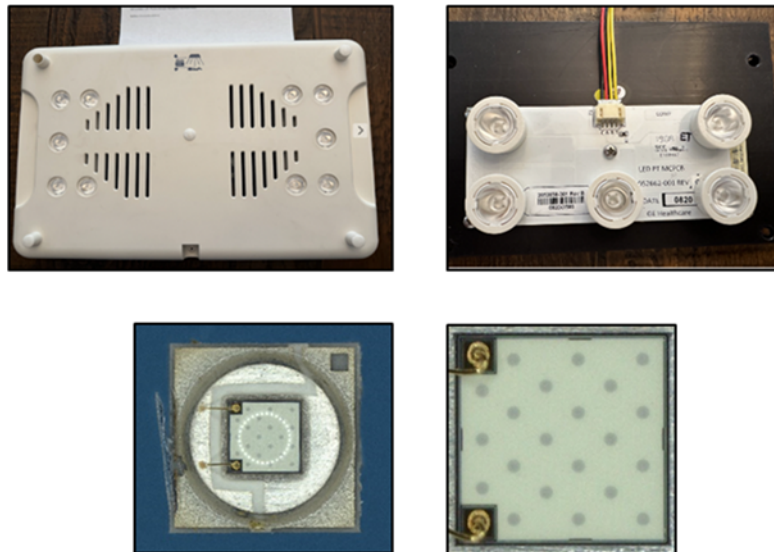
80. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT VII
INFRINGEMENT OF U.S. PATENT NO. 9,293,664
EXEMPLARY CLAIM 8

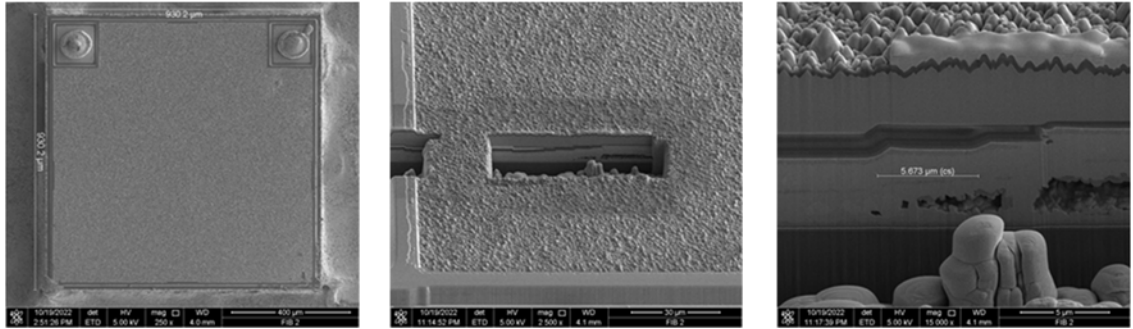
81. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 80 as though fully set forth herein.

82. GEHC has infringed and continues to infringe one or more claims of the '664 patent, including but not limited to exemplary claim 8, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

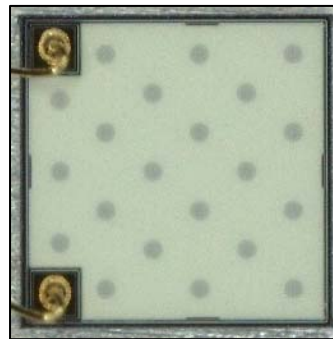
83. The GE Healthcare Lullaby LED Phototherapy System includes an LED module in which several LED packages are mounted on a circuit board. The images of the LED from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The image top left below depicts the GE Healthcare Lullaby LED Phototherapy System device. The image top right below is an LED module with 5 LED packages extracted from the device. The image bottom left below is the LED package, and the image bottom right below is an LED chip removed from the LED package. The LED package is bonded by surface mounting on the circuit board without bonding wires.



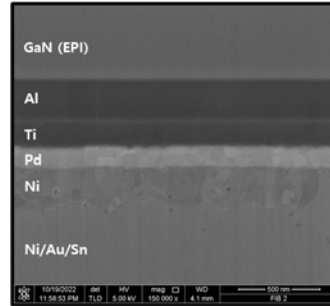
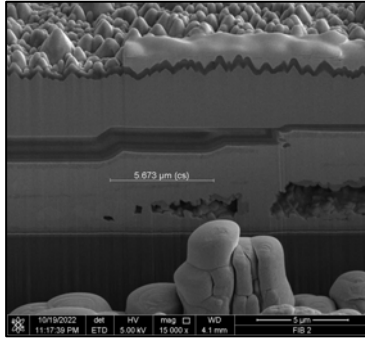
84. Three images of the LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The left image below is a SEM image of the top surface of the LED chip. The center and right images below are SEM images created after the creation of a hole in the LED chip using FIB. The right image below shows semiconductor layers in which a first conductive type (n-type) semiconductor layer, an active layer, and a second conductive type (p-type) semiconductor layer are sequentially stacked from top to bottom.



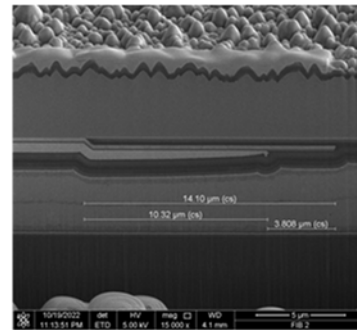
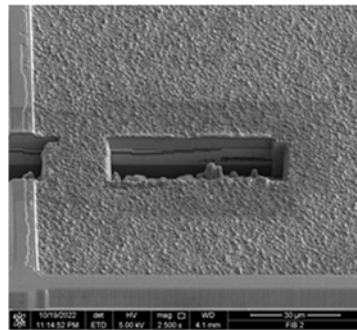
85. The optical microscope image below shows the locations of a plurality of contact holes that extend through the second conductive type semiconductor layer and active layer of the LED. The plurality of holes expose the first conductive type semiconductor layer.



86. The left image below is a SEM images showing the layer structure within the FIB-created hole. The right image below is an enlarged view of the layer structure under the semiconductor layers with an identification of the composition of the relevant layers. The top gray region in the right image below is a first conductive type semiconductor layer, and the central metal layer is a first electrode pad. The first electrode pad is electrically connected to the first conductive type semiconductor layer via the contact hole. The left image below also shows a protective insulation layer covering a sidewall of the first conductive type semiconductor layer.



87. Similarly, the SEM images below show the side surface of a hole milled into the LED chip. The relatively bright, thin layer extending from left to right center in the right image below is a second electrode pad arranged over the first side of the semiconductor stack. The second electrode pad is electrically connected to the second conductive type semiconductor layer.



88. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

89. GEHC's infringement has occurred with knowledge of the '664 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

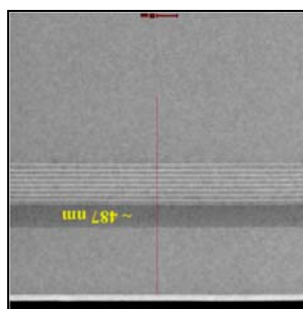
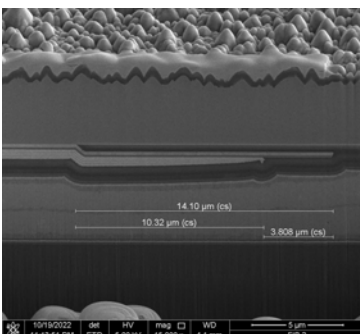
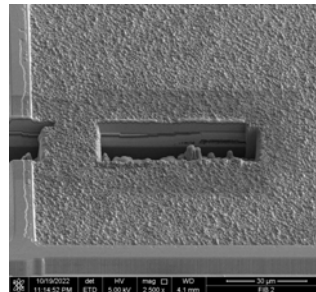
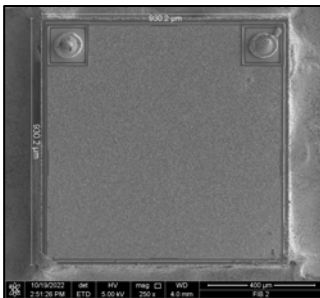
90. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT VIII
INFRINGEMENT OF U.S. PATENT NO. 8,648,369
EXEMPLARY CLAIM 1

91. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 90 as though fully set forth herein.

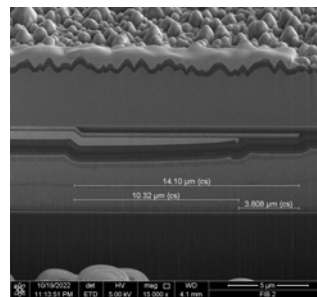
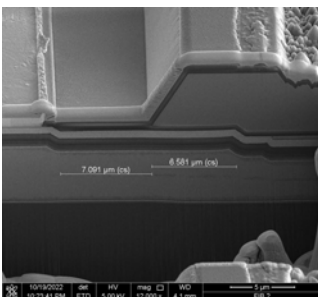
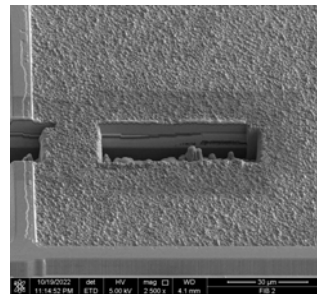
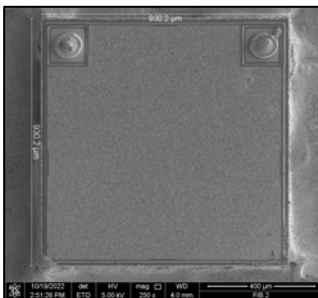
92. GEHC has infringed and continues to infringe one or more claims of the '369 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

93. Four images of an LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is a SEM image of the top surface of the LED chip. The other three images below are SEM and TEM images created after the creation of a hole in the LED chip using FIB.



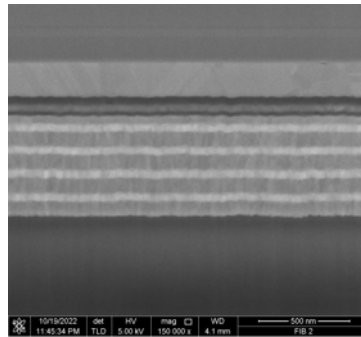
94. The bottom left image above is an image showing the layer structure within the FIB-created hole. The bottom right image above is an enlarged view of the layer structure. The LED chip includes a substrate, a first electrode, a first conductivity-type nitride semiconductor layer arranged on the substrate, a second conductivity-type nitride semiconductor layer arranged on the first conductivity-type nitride semiconductor layer, a first surface of the second conductivity-type nitride semiconductor layer comprising a roughened surface, and an active layer disposed between the first conductivity-type nitride semiconductor layer and the second conductivity-type nitride semiconductor layer.

95. Four additional images of the LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is a SEM image of the top surface of the LED chip. The other three images below are images created after the creation of a hole in the LED chip using FIB.



96. The bottom two images above show views of the layer structure under the semiconductor layers, including a bonding metal layer, a substrate, and a first electrode.

97. The image below is an enlarged view of the bottom right image above showing the layer structure in more detail.



98. The LED chip includes a reflective metal layer disposed between the first conductivity-type nitride semiconductor layer and the substrate, the reflective metal layer contacting a portion of the first conductivity-type nitride semiconductor layer, a protective metal layer disposed between the reflective metal layer and the substrate, the protective metal layer covering a portion of the reflective metal layer, a first insulating layer covering a portion of the first conductivity-type nitride semiconductor layer and a portion of the protective metal layer, a first connection metal layer electrically connecting the protective metal layer and the first electrode, a bonding metal layer disposed between substrate and the first conductivity-type nitride semiconductor layer, wherein the first electrode is on the same side of the substrate as the roughened first surface of the second conductivity-type nitride semiconductor layer.

99. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

100. GEHC's infringement has occurred with knowledge of the '369 patent and knowledge that its acts constitute infringement. GEHC's continuing conduct, therefore, is willful.

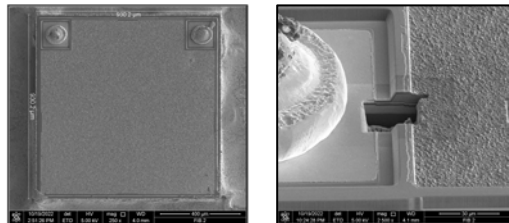
101. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

COUNT IX
INFRINGEMENT OF U.S. PATENT NO. 7,982,234
EXEMPLARY CLAIM 1

102. The Seoul Plaintiffs hereby adopt and re-allege the allegations set forth in paragraphs 1 through 101 as though fully set forth herein.

103. GEHC has infringed and continues to infringe one or more claims of the '234 patent, including but not limited to exemplary claim 1, in violation of 35 U.S.C. § 271(a), at least by without authority making, using, offering to sell and/or selling the GE Healthcare Lullaby LED Phototherapy System within the United States.

104. Three images of an LED chip from the GE Healthcare Lullaby LED Phototherapy System are reproduced below. The top left image below is an image of the top surface of the LED chip. The upper right and lower images below are images created after the creation of a hole in the LED chip using FIB.



107. The bottom left image above is an image showing the layer structure within the FIB-created hole. The bottom right image above is an enlarged view of the layer structure. The LED chip includes a metal material structure disposed on the second semiconductor layer, a metal reflection layer embedded in the metal material structure, to reflect light toward the compound semiconductor layers, an insulating structure disposed between the metal material structure and the periphery of the second semiconductor layer; and a substrate disposed on the metal material structure.

108. GEHC's infringement has caused and is continuing to cause damage and irreparable injury to Plaintiffs. Plaintiffs will continue to suffer damage and irreparable injury unless and until that infringement is enjoined by this Court, as a remedy at law alone would be inadequate.

109. The Seoul Plaintiffs are entitled to injunctive relief and damages in accordance with 35 U.S.C. §§ 271, 281, 283, and 284.

PRAYER FOR RELIEF

WHEREFORE, the Seoul Plaintiffs request that the Court enter judgment in their favor and against Defendant GEHC, as follows:

A. A judgment that Defendant has infringed and infringes the '514, '496, '225, '020, '483, '952, '664, '369 and '234 patents;

B. A preliminary and permanent injunction restraining and enjoining Defendant, its officers, partners, agents, servants, employees, parents, subsidiaries, divisions, affiliate corporations, joint ventures, other related business entities and all other persons acting in concert, participation, or in privity with them, and their successors and assigns, from infringing the '514, '496, '225, '020, '483, '952, '664, '369 and '234 patents;

C. An award of damages to Plaintiffs Seoul Semiconductor and Seoul Viosys arising from Defendant's past and continuing infringement up until the date Defendant is finally and permanently enjoined from further infringement, including compensatory damages;

D. A determination that Defendant's infringement of one or more of the '514, '496, '225, '020, '483, '952, '664, and '369 patents was willful, and a trebling of damages pursuant to 35 U.S.C. § 284;

E. A determination that this is an exceptional case and awarding the Seoul Plaintiffs attorneys' fees pursuant to 35 U.S.C. § 285;

F. An order awarding the Seoul Plaintiffs the costs and expenses that they have incurred in prosecuting this action;

G. An order awarding the Seoul Plaintiffs pre- and post-judgment interest on their damages; and

H. Such other and further relief in law or in equity as this Court deems just and proper.

JURY DEMAND

Plaintiffs Seoul Semiconductor and Seoul Viosys respectfully request a jury trial on all issues so triable.

MORRIS, NICHOLS, ARSHT & TUNNELL LLP

/s/ Jack B. Blumenfeld

OF COUNSEL:

David C. Radulescu, Ph.D.
Etai Lahav
Bryon Wassermen
RADULESCU LLP
5 Penn Plaza, 19th Floor
New York, NY 10001
(646) 502-5950

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Jack B. Blumenfeld (#1014)
Jeremy A. Tigan (#5239)
1201 North Market Street
P.O. Box 1347
Wilmington, DE 19899
(302) 658-9200
jblumenfeld@morrisnichols.com
jtigan@morrisnichols.com

*Attorneys for Plaintiffs Seoul Semiconductor
Co., Ltd. and Seoul Viosys Co., Ltd.*