

PUBLIC VERSION

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG DISPLAY CO., LTD.,
Petitioner,

v.

PICTIVA DISPLAYS INTERNATIONAL LTD.,
Patent Owner.

Case No. IPR2024-01095
Patent No. 11,828,425

**PATENT OWNER'S AUTHORIZED STATEMENT REGARDING
DISTRICT COURT TRIAL**

EXHIBIT LIST

Exhibit	Description
2001	Disclaimer, U.S. Patent 11,828,425 (filed Oct. 25, 2024)
2002	Declaration of P. Morgan Pattison, Ph.D.
2003	Kim, H. M., Seo, J. H., Han, W. K., Lee, K. H., Kang, H. J., Yoon, S. S., & Kim, Y. K. (2011), Improvement of Mixed Electron Transport Structure Red Phosphorescent Organic Light-Emitting Diodes, Molecular Crystals and Liquid Crystals, 538(1), 53–60
2004	Arunandan Kumar, Ritu Srivastava, Priyanka Tyagi, D. S. Mehta, M. N. Kamalasanan, Effect of doping of 8-hydroxyquinolinatolithium on electron transport in tris(8-hydroxyquinolino)aluminum, J. Appl. Phys. 1 June 2011; 109 (11): 114511
2005	Chan Seok Oh, Jun Yeob Lee, High triplet energy n-type dopants for high efficiency in phosphorescent organic light-emitting diodes, Organic Electronics, Volume 16, 2015, Pages 34-39
2006	Sunwoo Kang, Sang Ho Jeon, Taekyung Kim, Unraveling the complexation effect of electron transporting materials with Liq on the charge transport properties: A theoretical perspective, Chemical Physics Letters, Volume 810, 2023, 140207
2007	T. Sasaki, T. Oono, T. Shimizu, H. Fukagawa, Effects of Energy-Level Alignment on Operating Voltages of Blue Organic Light-Emitting Diodes. Adv. Mater. Interfaces 2023, 1, 2201925
2008	Vadim I. Adamovich, Steven R. Cordero, Peter I. Djurovich, Arnold Tamayo, Mark E. Thompson, Brian W. D'Andrade, Stephen R. Forrest, New charge-carrier blocking materials for high efficiency OLEDs, Organic Electronics, Volume 4, Issues 2–3, 2003, Pages 77-87
2009	Björn Lüssem, Chang-Min Keum, Daniel Kasemann, Ben Naab, Zhenan Bao, and Karl Leo, Doped Organic Transistors, <i>Chemical Reviews</i> 2016 116 (22), 13714-13751

Exhibit	Description
2010	U.S. Patent No. 11,585,504
2011	U.S. Patent No. 10,605,422
2012	U.S. Patent No. 9,797,567
2013	Federal Court Management Statistics for U.S. District Courts, available from https://www.uscourts.gov/statistics/table/na/federal-courtmanagement-statistics/2024/06/30-1
2014	Samsung Invalidity Contentions in the parallel district court case
2015	2024-12-16 Email from Samsung to Pictiva re “IPR2024-01095 – Stipulation”
2016	Deposition Transcript of Dr. Schubert with Ex. 1 of the deposition (Schubert Declaration)
2017	Intentionally omitted
2018	2025-05-05 Declaration of P. Morgan Pattison, Ph.D.
2019	2025-04-24 Holmes Transcript
2020	2025-04-18 Holmes Transcript
2021	Yang, Kwangmo et al., <i>Interfacial Exciton-Polaron Quenching in Organic Light-Emitting Diodes</i> , Physical Review X 14, 041009 (2024)
2022	Screen shot of https://www.ossila.com/products/8-quinolinolato-lithium (last visited 05/04/2025)
2023	Jun Yeob Lee, <i>Efficient electron injection in organic light-emitting diodes using lithium quinolate/Mg:Ag/Al cathodes</i> , Journal of Industrial and Engineering Chemistry 14, 676–678 (2008)
2024	Kim, B. Y. et al., <i>Efficient Green Phosphorescent Organic Light-Emitting Diodes Depending on Concentration of Lithium Quinolate in Electron Transport Layer</i> , Journal of Nanoscience and Nanotechnology, Vol. 13, 7998-8001 (2013)

Exhibit	Description
2025	Le, T. N. et. al. <i>Suppression of Initial Degradation via an Interfacial Charge-Induced Overshooting Effect in Solution-Processed Organic Light-Emitting Diodes</i> , ACS Applied Materials & Interfaces 16, 69636-69644 (2024)
2026	Tanaka, I. et al., <i>Energy-transfer dynamics of blue-phosphorescent iridium and rhodium complexes doped in fluorescent molecules</i> , Journal of the SID 16/6, 695-701 (2008)
2027	C. Schmitz et al., <i>Lithium-Quinolate Complexes as Emitter and Interface Materials in Organic Light-Emitting Diodes</i> , Chem. Mater., 12, 3012-3019 (2000)
2028	Reineke, Sebastian et al., <i>Triplet-exciton quenching in organic phosphorescent light-emitting diodes with Ir-based emitters</i> , Physical Review B 75, 125328 (2007)
2029	printout of https://web.archive.org/web/202500000000000*/www.elsevier.com/locate/synmet (last visited 05/03/2025)
2030	[UNDER SEAL] Excerpt of Katona Rebuttal Report
2031	District Court Claim Construction Order
2032	[UNDER SEAL] 2025-09-03 Holmes Deposition Transcript
2033	Jury Verdict Form in the parallel district court action
2034	[Under Seal] Jury trial transcript (excerpt) in the parallel district court action
2035	Wei reference (JX-48)
2036	Kondakova reference (DX-32)
2100	U.S. Patent No. 7,911,129
2101	K. Walzer et al., <i>Highly Efficient Organic Devices Based on Electrically Doped Transport Layers</i> , 107 Chem. Rev. 1233-71 (2007)

Exhibit	Description
2102	U.S. Publication No. 2008/0116536 to Forrest
2103	Felipe A. Angel et al., <i>Silver-induced activation of 8-hydroxyquinolinato lithium as electron injection material in single-stack and tandem OLED devices</i> , Organic Electronics 59, 220-223 (2018)
2104	Min Seok Ki et al., <i>Improved Thermal Stability and Operational Lifetime of Blue Fluorescent Organic Light- Emitting Diodes by Using a Mixed-Electron Transporting Layer</i> , ACS Materials Lett. 4, 1676–1683 (2022)
2105	T. Sasaki et al., <i>Effects of Energy-Level Alignment on Operating Voltages of Blue Organic Light-Emitting Diodes</i> , Supporting Information for Adv. Mater. Interfaces 2023, 10, 2201925, available at DOI: 10.1002/admi.202201925 (supporting information for EX2007)

The discussion below explains the relevance of the trial testimony and the jury findings that underlie the verdict for claim 2 of the '425 patent. EX2033.

Trial Testimony by Petitioner's Witness Underscores Non-Obviousness. At trial, Petitioner's engineer in charge of OLED materials testified to a new non-infringement theory: [REDACTED]

[REDACTED] EX2034, 838:20-25, 848:16-22. Thus, for infringement, Petitioner argues that, to "n-dope[]" as claimed, [REDACTED] must have a HOMO that is higher than the LUMO of the electron transporting material ("ETM") to be doped. But here, it takes the contrary position that a POSITA would have used Liq as a "molecular dopant" "suitable for emitting electrons" in Diekmann/Suzuki (EX1003, ¶144, Pet. 37) even though *Liq's HOMO is indisputably far below the LUMOs of the prior art ETMs* to be doped (POR 30). It also asserts that Pictiva's argument "Liq was not considered a 'suitable molecular n-dopant' (POR, 30) is *incorrect*." Reply 10.

To be clear, Petitioner's interpretation of n-doping at trial is overly narrow as it excludes n-doping that operates via, e.g., increasing the number of electrons entering the ETL from the cathode as in the infringing products. EX2034, 310:14-311:11, 323:22-324:15, 327:1-329:9. But that interpretation is consistent with n-doping by a "molecular dopant" that is the basis of the Petition, which operates by transferring electrons from its HOMO to the LUMO of the ETM and needs a small

energy gap between its HOMO and the ETM's LUMO to effect this charge transfer. EX2018, ¶¶22-23; POR 30; EX1046, ¶¶20-23, 68-69. That is why Liq, whose HOMO is much lower than the LUMOs of ETMs, is not a suitable molecular n-dopant under Petitioner's theory. *Id.* But unlike for the infringing products, there is no evidence that Liq in Ma or modified Diekmann/Suzuki helps increase the number of electrons in ETL or otherwise emit electrons. *See* POR 30-31 ("Liq in Ma indisputably ... does not promote electron injection from the cathode"); Sur-Reply 15-16 (EX2004: Liq can increase barrier for electron injection into ETL). Thus, given Petitioner's position on what is required for n-doping and Liq's low HOMO level compared to the ETMs' LUMOs (POR 30), the Board should find that it is not obvious to use Liq as an electron-emitting molecular n-dopant as argued in the Petition and supporting declarations to maintain consistency with the related matter.

Cumulative Invalidity Theories Support Non-Obviousness. The RPI ("Samsung") presented two grounds of invalidity at trial against claim 2 of the '425 patent, each of which is cumulative of Petitioner's IPR theories.

Samsung first relied on a product called Clix2 combined with Wei (EX2035). Clix2 included an electron transport layer ("ETL") having a mixture of [REDACTED] and an ETM, but Petitioner conceded that the [REDACTED]-containing ETL is not n-doped. EX2034, 917:1-13, 920:8, 1208:9-20. Petitioner's failure to obtain an n-doped ETL by mixing [REDACTED] with ETM supports Pictiva's argument of unpredictability and lack of reasonable expectation of success in using [REDACTED] as an n-dopant. *See* POR 45-46; Sur-Reply 14

(Samsung expert: “[REDACTED] can be an n-dopant and also cannot be”); EX2034, 324:6-12 472:11-474:19 (whether [REDACTED] n-dopes and the doping mechanisms vary with ETMs).

The jury further rejected Samsung’s argument that the n-doped ETL feature was taught and rendered obvious by Wei. EX2034, 920:8-16. Wei and Ma have materially the same disclosure. *Compare* EX2035 (Wei) *with* EX1010 (Ma) (sharing Wei Xu/Xu Wei, Zhang Zhilin/Z.L. Zhang, and Jiang Xueyin/X.Y. Jiang as co-authors). Hence, the jury rejected an assertion that is materially the same as the theory here, namely, that a POSITA would substitute the ETL layer in a known device with Wei/Ma’s Liq-containing ETL to arrive at claim 2. Pet 36-38, 69-70.

Samsung’s second ground of invalidity relied on a reference called Kondakova (EX2036) that could have been asserted in the IPR. EX2034, 920:21-922:6. Samsung’s expert alleged that Kondakova discloses all limitations, including an n-doped ETL with an alkaline metal such as lithium (“Li”) and cesium (“Cs”). *Id.* (referencing EX2036, [0355]). The expert further alleged that per Kondakova, for its ETLs, “any metal chelated oxynoid can be used, of which [REDACTED] is an example.” *Id.* Thus, the Kondakova ground relies on the same theory as the Petition, namely, that it would be obvious to replace known n-dopants in an ETL with Liq to obtain a PHOLED of claim 2. By finding claim 2 not invalid, (EX2033), the jury necessarily found that (1) a POSITA would not have been motivated to n-dope ETL with Liq and/or (2) there was not a reasonable expectation of success to obtain an n-doped PHOLED with Liq. Either finding is fatal to Petitioner’s invalidity theories.

Dated: November 18, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify, pursuant to 37 C.F.R. § 42.6, that on November 18, 2025, a complete copy of the **PATENT OWNER'S AUTHORIZED STATEMENT REGARDING DISTRICT COURT TRIAL** and **EX2033-2036** were served upon the following, by ELECTRONIC MAIL:

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