UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SUZHOU MOJAWA INTELLIGENT ELECTRONIC CO., LTD.,
Petitioner,

v.

SHENZHEN SHOKZ CO., LTD.,
Patent Owner.

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U.S. Patent No. 11,197,084

Case IPR2025-00842

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REBUTTAL DECLARATION OF CHRIS KYRIAKAKIS, PH.D IN SUPPORT OF PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

I, Chris Kyriakakis, Ph.D., declare as follows:

I. INTRODUCTION

1. My name is Chris Kyriakakis. My background and qualifications have been previously set forth. *See* EX1003, ¶¶5-18. I am submitting this Declaration on behalf of Suzhou Mojawa Intelligent Electronic Co., Ltd. ("Petitioner") in support of the *inter partes* review ("IPR") of U.S. Patent No. 11,197,084 ("the ʾ084 patent"), which I understand is Exhibit 1001 to the petition submitted to the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I am competent to testify under oath, and will do so if called as a witness, as follows herein.

2. Specifically, I have been asked to consider whether any of my opinions set forth in my earlier declaration (EX1003) with respect to claims 1-10 and 12-20 ("the challenged claims") have changed in view of subsequent papers being presented in this IPR, including the Response by Patent Owner Shenzhen Shokz Co., Ltd. ("Patent Owner") (Paper 22, "POR") and exhibits filed by Patent Owner (Exhibits 2001-2023). In addition to those items, I have also considered other items discussed below.

3. It is still my opinion that the challenged claims of the ʾ084 patent would have been obvious as set forth in my earlier declaration (EX1003).

4. In reply to Patent Owner's Response (Paper 22) and the "Declaration of Michael Scordilis, Ph.D. in Support of Patent Owner's Response to Petition for *Inter Partes* Review of U.S. Patent No. 1,197,084 B2" ("Scordilis," EX2020), I disagree in many respects. I address some of these points here.

II. GROUND 1: THE COMBINATION OF LI AND FUJITA RENDERS CLAIM 1 OBVIOUS

A. Reply to Patent Owner's Arguments Regarding the Li-Fujita Combination

1. The Li-Fujita Combination is Proper

5. Dr. Scordilis opined that a POSITA would not have been motivated to combine the teachings of Li and Fujita. Scordilis, ¶¶75-89; *see also* POR 15-25. I disagree. A POSITA would have been motivated to combine teachings of Li and Fujita by, for instance, a desire for improved acoustic efficiency in a wearable bone conduction device. Making such a combination was well within the technical abilities of a POSITA to implement using Li's own disclosed structural and elastic materials. A fundamental goal of bone conduction earphone design is efficiently transmitting vibration while maintaining user comfort. Li provides a robust structural framework for a "bone conduction earphone" with a flexible/bendable ear hook. EX1004, ¶¶[0003]-[0005]. However, Li's description of the internal speaker mechanism does not focus on optimizing the vibration transmitting interface. Fujita is specifically directed to the problem of optimizing vibration

transmission and contact efficiency to the user's skin. EX1022, ¶¶[0007]-[0008]. Fujita teaches that a convex vibration transmitting part is superior for making secure contact with the skin, thereby achieving the "most effective vibration transmission." EX1022, ¶¶[0032]-[0034].

6. A POSITA seeking to improve vibration transmission in Li would have naturally looked to Fujita's specialized vibration transmitting structure. Integrating Fujita's convex contact surface into Li's housing—which is already designed for users to "hang. . .on their ears" (EX1004, ¶[0025])—is a predictable improvement directed toward improving vibration transmission. Fujita further teaches that its convex contact structure allows vibration to be effectively transmitted under different use wearing positions and contact angles. EX1022, ¶¶[0038]-[0039].

2. Li's Disclosed Elastic Materials and Internal Structures Resolve the Technical Challenges Alleged by Patent Owner Regarding Waterproofing

7. Dr. Scordilis opined that Fujita's speaker purportedly requires an "open gap" to vibrate which would destroy the waterproofing required by Li. Scordilis, ¶¶80-86; *see also* POR 15-22. I disagree for the following reasons.

8. First, Dr. Scordilis is incorrect because it presumes the purported "open gap" is indeed an actual open area in the design. Fujita never teaches that there is such a gap. Indeed, Fujita never once uses the term "gap" in any context or

describes this area of the design as open. It is common practice in the industry that the alleged "gap" would be filled with a gasket, such as a rubber gasket/stopper to reduce secondary vibration that degrades sound quality. Fujita implies as much where it states:

> The cushion 16 is positioned and fit between a positioning hole and a boss, then fixed in high rigidity state. When the fixation between the vibration output part 11a and the cushion 16 is weak, secondary vibration occurs between the two, and harsh sound information with the secondary vibration is transmitted to the user.

EX1022, ¶[0028]. As it is likely the design of Fujita already includes such a rubber gasket/stopper instead of a gap, it is further well within the skill of a POSITA to make such gasket/stopper watertight.

9. Dr. Scordilis is incorrect because he presumes a POSITA would be incapable of implementing basic sealing techniques—techniques that Li itself suggests. Li explicitly discloses that its housing can be covered with an "elastic coating layer" (1132 or 122) made of "silicone" or "rubber." EX1004, ¶¶[0028], [0058]. A POSITA would immediately recognize that this elastic layer can act as a waterproof diaphragm. By implementing Li's disclosed silicone or rubber coating structures around Fujita's vibrating speaker assembly and support interfaces, a POSITA would maintain waterproofing while still accommodating the disclosed vibrational movement of Fujita's speaker. This is not "reinventing" the art; it is the

routine application of Li's own taught materials (silicone/rubber) to a standard engineering challenge.

10. Second, Li's waterproofing approach is not limited to a single exterior housing barrier. Li discloses an internal "waterproof lining board" (143) that is in "elastic contact" with the inner walls to protect the electronic components. EX1004, ¶[0071], Fig. 14; *see also* EX1004, ¶[0073] (describing improved waterproof performance resulting from the elastic coating layer). Li further discloses a "waterproof and dustproof filter screen," such as a "waterproof breathable membrane," associated with the sound holes of the fourth housing. EX1004, ¶[0056]. These disclosures demonstrate that Li expressly contemplates multiple waterproofing structures, including elastic and vibration-compatible waterproofing components. A POSITA therefore would not have been deterred from implementing minor mechanical adaptations needed to incorporate Fujita's vibrating speaker structure while maintaining waterproof performance.

11. Third, Fujita itself discloses viscoelastic supporting components 25a and 25b associated with the vibrating speaker assembly. EX1022, ¶[0029]. Fujita explains that the supporting components 25a and 25b absorb vibration while supporting the speaker structure, and further discloses that the viscoelastic material may include "a silicone material." *Id.* Thus, Fujita itself contemplates the use of compliant silicone structures in the speaker support region. A POSITA would have

understood that such compliant structures could be implemented consistently with Li's disclosed waterproofing techniques and elastic coating materials while still permitting the disclosed vibrational movement of Fujita's speaker assembly. A POSITA also would have recognized that compliant elastomeric structures analogous to known speaker "surround" materials could be used in the support/interface region to accommodate vibration while maintaining environmental protection. Such compliant rubber or silicone structures were well known in loudspeaker design for permitting controlled vibrational movement between moving and supporting structures.

3. Li's Existing Leakage-Cancellation Features Negate Patent Owner's Sound Leakage Concerns

12. Dr. Scordilis opined that the Li-Fujita combination would result in "unacceptable sound leakage" due to the purported gap. Scordilis, ¶¶87-88; *see also* POR 22-23. I disagree because Li is specifically designed to solve the problem of sound leakage. Li discloses "strip-shaped sound holes" (1151) positioned on the housing to "interfere[] with the sound leakage waves" and "reduce the sound leakage." EX1004, ¶¶[0050]-[0053]. Li's entire acoustic architecture is built to manage and cancel leakage through phase interference. *Id.* A POSITA would understand that any incidental leakage resulting from the integration of an optimized speaker (like Fujita's) could be mitigated using the very sound-hole and acoustic-cavity techniques Li already teaches. Moreover,

Fujita itself expressly addresses sound leakage reduction. Fujita explains that supporting components 25a and 25b attenuate vibration transmitted to the casing such that "sound leakage can be prevented." EX1022, ¶[0044]. Thus, both Li and Fujita disclose structures directed to controlling or reducing sound leakage, further supporting that a POSITA would have reasonably expected successful integration of the references.

B. Claim 1: An Ear Hook With First and Second Plug Ends (Element 1[a]) Would Have Been Obvious

1. Li Does Not Teach Away From an Ear Hook With First and Second Plug Ends

(a) Structural Stability and Integrity Concerns Do Not Negate Obviousness

13. Dr. Scordilis opined that adding first and second plug ends to the Li ear hook would be "in contradiction to" or "incompatible with" Li's disclosure. Scordilis, ¶¶98-102, 110-117; *see also* POR 27-29, 33-36. I disagree for the following reasons.

14. Li's disclosure of locking or adhesive reinforcement features does not teach away from plug-based modular construction. Dr. Scordilis is incorrect that "[t]eachings of adhesives and locking pieces [in Li] [*sic*] is inherently inconsistent with the principle of interchangeability." Scordilis, ¶112; *see also* POR 35. Li discloses adhesive application and locking piece insertion to enhance connection are "optional," EX1004, ¶[0060], and therefore these optional features would not

render Li incompatible with interchangeable modularity. Li discloses that adhesive application and locking piece insertion may enhance the connection. EX1004, ¶[0060]. These optional features would not render Li incompatible with interchangeability or modularity. Li's plug-in connection structure is consistent with modular assembly, disassembly, and interchangeability. EX1004, ¶[0059] (plug in portion 123 facilitates later wiring). A locked plug connection is also not incompatible with interchangeable modularity. Li also discloses the locked plug connection can be made with reversible or removable structure such as a wedge or pin. EX1004, ¶[0061]. I also note that "interchangeability" is one of several reasons (e.g., simplified manufacturing and reduced costs) for adopting a modular construction with first and second plug ends.

(b) Waterproofing Concerns Do Not Obviate Motivation to Include Plug Ends

15. Dr. Scordilis opined that "waterproofing concerns" would discourage a POSITA from modifying Li to include first and second plug ends. Scordilis ¶¶103-109; *see also* POR 30-33. I disagree. Li discloses multiple waterproofing structures, including elastic coating layers, waterproof lining boards in elastic contact with surrounding structures, and waterproof breathable membranes. EX1004, ¶¶[0028], [0056], [0071]-[0073]. A POSITA was very familiar with waterproofing techniques, including using an elastomeric material to seal the seam formed between adjoining components. A POSITA would have been motivated to

modify Li's ear hook to include first and second plug ends to achieve the benefits of modularity, including those specifically mentioned in Li, namely "simplifying the structure, … facilitating later wiring, and reducing costs," EX1004, ¶[0059], notwithstanding any increased risk of water infiltration.

2. A POSITA Would Have Modified Li to Include First and Second Plug Ends

16. Dr. Scordilis opined that the references I considered do not disclose an ear hook with first and second plug ends. Scordilis, ¶¶91-96, 114-117; *see also* POR 35-44. The references demonstrate that a POSITA would have found such an arrangement obvious. A POSITA would have understood that modular connections are naturally located at interfaces between structural support components and functional modules, including the interfaces between the ear hook and the core housing and between the ear hook and the circuit housing. A POSITA would have understood there to be a finite number of places where modular connections would be located in a loudspeaker apparatus to achieve the benefits of modular construction, among which are the first and second ends of the ear hook.

17. In a bone-conduction earphone, the ear hook mechanically supports the core housing, which contains the speaker, and the circuit housing, which contains the battery or control circuit. A POSITA would have understood these two junctions are natural locations for modular separation because they are the interfaces between the ear hook and the corresponding functional modules.

18. A POSITA, seeking to gain the well-known benefits of modular construction, including simplified manufacturing, facilitated wiring, component replacement, cost reduction, would have recognized that providing plug ends at these interfaces is an obvious and predictable design choice.

C. Claim 1: Li Discloses or Suggests the Core Housing Being Elastically Abutted Against the Protective Sleeve (Element [1c])

19. Dr. Scordilis opined that "[t]here is nothing within Li that suggests that the elastic coating layer 122 is elastically compressed [abutted] against the end surface of the housing 111 when the plug-in portion 123 is inserted." Scordilis, ¶¶119-124; *see also* POR 44-50. I disagree.

20. Li discloses the second elastic coating layer 122 abuts a housing when "plug-in portions 123 are respectively connected and fixed to the first housings 111 of the two ear hook assemblies 11." EX1004, ¶[0058], FIGS. 2, 3, 5, 9, 10. Li's figures collectively show the second elastic contacting layer 122 contacting a housing. EX1004, FIGS. 2, 5, 9, 10 (below).

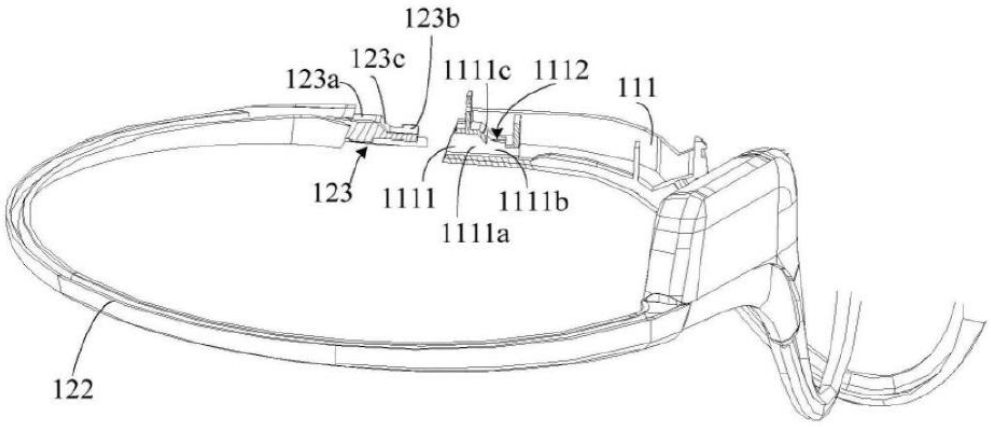


Figure 10

EX1004, FIG. 10

21. A POSITA would have understood that the second elastic coating layer 122 undergoes elastic deformation when it abuts the housing. Li discloses the plug-in portion 123 and the plug-in hole 1111 are configured for a "tight fit" between them so that "the rear hook can be effectively connected to the ear hook. EX1004, ¶¶[0063]-[0064]. As shown below, a POSITA would have understood the plug-in portion 123 fully occupies the plug-in hole 1111 when inserted and that the second elastic coating layer 122 would undergo elastic compressive deformation upon contact with the end of the plug-in hole 1111 of the housing 111 to effect the tight fit therebetween and to account for ordinary engineering tolerances. A POSITA would have understood the second elastic coating layer 122 to form an interference-type relationship with the housing 111 such that the second elastic coating layer 122 undergoes elastic deformation when it is elastically abutted against the housing 111.

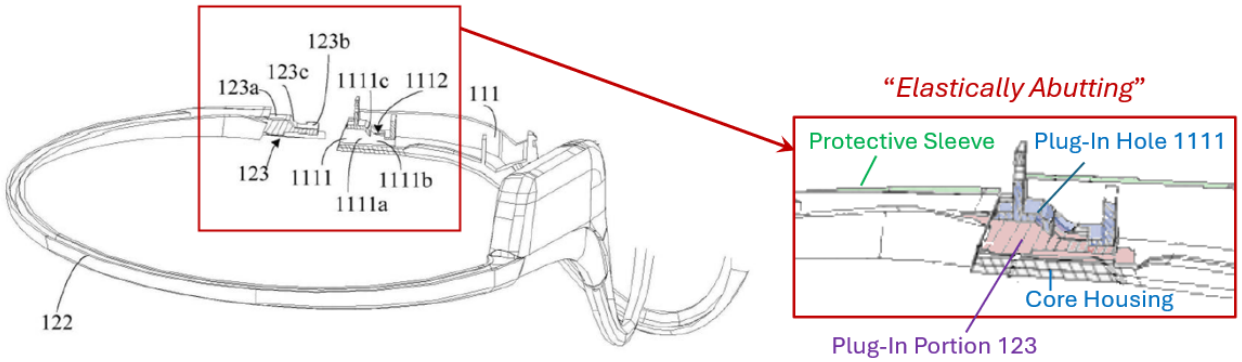


Figure 10

EX1004, FIG. 10 (annotated)

22. The compression of the second elastic coating layer 122 in the Li-Fujita combination follows the same elastically abutting relationship described in the '084 patent. The '084 patent describes the protective sleeve 16 as including an "abutting" surface: "the protective sleeve 16 forms an annular abutting surface 161 on the outer end surface 21 of the annular table surface 1422 facing the outer end surface of the core housing 20." EX1001, 13:26-29; FIG. 6. An annular boss 162 extends radially inward from the annular abutting surface 161. *Id.*, 13:32-41. The protective sleeve 16 is undergoes elastic deformation when elastically abutted against the core housing: "[W]hen the core housing 20 and the plug end 14 are plugged and fixed, the annular abutting surface 161 and the annular boss 162 may elastically abut against the outer end surface [21] of the core housing 20 and the connecting slope 24, respectively." EX1001, 13:54-58, FIG. 6. The protective sleeve undergoing elastic deformation by being compressed against the core

housing, as described in the ’084 patent, would have been obvious to a POSITA in view of the Li-Fujita combination.

III. GROUNDS 2–5 DEMONSTRATE THE CHALLENGED DEPENDENT CLAIMS ARE OBVIOUS

A. A POSITA Would Have Been Motivated to Incorporate Fukuda’s Modular Driver into Li’s Structural Framework

1. The Substitution of Fukuda’s Modular Driver is Rooted in Established Acoustic Engineering Principles

23. In reply to Patent Owner’s argument that the Petition provides only conclusory statements and fails to explain how Fukuda’s magnetic circuit system would be integrated with the structural features of Fujita and Li (POR 54-55), I disagree. Patent Owner’s position ignores the routine capabilities of a POSITA and the modular nature of the prior art. Fukuda explicitly touts its magnetic driver as an “independent unit” that is “simple in construction” and designed for incorporation into various devices. EX1023, 3:23-28. A POSITA, motivated by the desire for efficient, high-quality sound and low manufacturing cost, would have found it straightforward to house Fukuda’s discrete driver within the space provided in Fujita’s housing.

B. Fukuda’s Magnetic Driver is Functionally Compatible with Fujita’s Acoustic Interface and Provides Independent, Predictable Benefits

24. Dr. Scordilis opined that the linear vibration of Fukuda’s magnetic driver would “destroy the entire premise” of Fujita’s speaker, which purportedly

requires rotational or hinged vibration. Scordilis, ¶¶131-156 at 137-145; *see also* POR 55-63. I disagree. Dr. Scordilis's opinion is a mischaracterization of Fujita's technical objectives and ignores the routine capability of a POSITA to integrate complementary modular components.

1. Fujita's "Key Benefit" is the Convex Contact Interface, Not a Mandatory Hinged Motion

25. Dr. Scordilis opined that Fujita's design is inseparable from its rotational vibration mechanism. Scordilis, ¶¶137-145 at 140; *see also* POR 55-63. I disagree. Fujita's own disclosure identifies its primary objective as "efficiently" transmitting vibration to the user by ensuring "accurate contact with the face." EX1022, ¶¶[0007]-[0008]. Fujita teaches that this is achieved through its "convex vibration transmitting part" (cushion 16), which minimizes vibration loss at the contact point. S*ee* EX1022, ¶¶[0008], [0032]-[0034], and [0037].

26. A POSITA would recognize that this convex geometry provides an effective vibration-transmission interface regardless of whether the internal driver moves linearly or rotationally. Incorporating Fukuda's magnetic driver into Fujita's piezoelectric vibration transmission structure does not "destroy" the benefit of Fujita's convex contact surface. Rather, a POSITA would have understood that Fukuda's driver to provide a well-known alternative vibration-generation mechanism in a more cost-effective and leakage-resistant method of driving that same surface. *See* EX1023, 3:23-28.

27. A POSITA would understand that the convex shape of Fujita's vibration transmitting part (cushion 16) serves to concentrate contact pressure at the vertex, minimizing energy loss at the skin interface. This benefit is independent of the type of motion generated by the internal driver. While Fujita's piezoelectric element produces a rotational displacement, the convex surface does not require rotational motion to function effectively. Linear displacement of the convex surface—such as that produced by a magnetic voice coil—will still transmit vibrational energy to the user's skin. In fact, for certain frequency ranges (e.g., mid-to-high frequencies), a linear piston-like motion can provide more consistent amplitude control and lower distortion compared to a hinged motion, potentially improving perceived sound quality. A POSITA seeking to optimize a bone conduction device would therefore consider using a linear magnetic driver not as a 'destruction' of Fujita's design but as an alternative implementation that retains the convex interface's benefits while gaining the efficiency and manufacturing advantages of a magnetic circuit.

2. Adapting a Housing to Different Driver Motions is Routine Mechanical Engineering

28. Dr. Scordilis opined that the combination would be ineffective because linear and rotational motions are incompatible. Scordilis, ¶¶139-144; *see also* POR 55-63. I disagree. Such an argument ignores the modular nature of bone

conduction components. Fukuda explicitly describes its driver as an "independent unit" ready for incorporation into mobile devices. EX1023, 3:23-28.

29. A POSITA—who by definition possesses professional experience in acoustic technology—would find it trivial to modify the internal mounting structures of the Li/Fujita housing to accommodate the vertical axis of Fukuda's magnetic circuit. Fukuda's vertically-aligned coil and magnets provide a compact footprint that is inherently compatible with the "tight fit" required by Li's segmented housings. A POSITA would have understood that different known vibration-generation mechanisms (including piezoelectric and magnetic drivers) could be integrated with known vibration-transmission interfaces and elastic contact structures. Fukuda expressly teaches that its speaker unit can be incorporated "as it is" in a casing of mobile phones. EX1022, 3:23-28. Accordingly, the convex interface remains an effective solution for both linear and rotational drivers with any frequency-response differences being adjustable through driver tuning techniques, such as coil mass, magnet strength, or suspension stiffness adjustments.

3. The Motivation to Use Fukuda's Driver is Driven by Efficient Performance and Cost Benefits

30. Dr. Scordilis opined that "there would be no reason to substitute [Fujita's] piezoelectric element with another linear driver such as Fukuda's magnetic driver." Scordilis, ¶¶134-156 at 143; *see also* POR 55-63 at 61. I

disagree. By the priority date, a POSITA would have known that magnetic speaker drivers generally offer easier frequency tuning and higher fidelity in consumer electronics than piezoelectric drivers. A POSITA would further have been motivated to integrate Fukuda's superior driver into the wearable, consumer-oriented framework of Li as a response to the industry's known need for mass-producible, high-fidelity bone conduction devices.

C. Petitioner's Motivations to Combine Fukuda's Magnetic System with Li-Fujita are Sound

1. Liao Discloses Specific Technical Objectives for Optimizing Sound Quality Through Magnetic Materials

31. In reply to Patent Owner's argument that Liao (EX1005) does not provide a comparative motivation because it lists energy conversion methods without a "piezo-to-magnet" comparison (POR 63-67), I disagree. The lack of such a comparison misses the point. Liao expressly teaches that in bone conduction speaker design, "using high-density permanent magnets . . . can achieve better sound quality." EX1005, ¶[0053]. Liao's disclosure establishes that a POSITA, seeking to improve "sound quality" of bone conduction earphones (such as in Li), would look to specific magnetic circuit designs to achieve those stated goals. EX1005, ¶¶[0052]-[0053]. Liao lists multiple energy-conversion approaches, including piezoelectric, and identifies the use of permanent magnets as a direct means to enhance fidelity. *Id.* Liao thus teaches that the selection and design of

magnetic circuit components, including the use of high-density permanent magnets, can improve sound quality in bone conduction speakers. A POSITA seeking to improve sound quality in wearable bone conduction devices such as Li and Fujita therefore would have been motivated to employ a magnetic-driver architecture such as Fukuda's.

2. Xu, Nielsen, and Nakada Establish the Industry-Wide Motivation to Optimize Magnetic Circuits for High Sensitivity and Efficiency

32. In reply to Patent Owner's argument that Xu (EX1009), Nielsen (EX1010), and Nakada (EX1018) are irrelevant because they describe improvements over prior magnetic systems rather than piezoelectric systems (POR 64-65), I disagree. These references collectively demonstrate that contemporaneous designers were actively optimizing magnetic-circuit speaker architectures to improve "low sensitivity" (EX1009, ¶¶[0002]-[0003]), "weak" electromagnetic force, and "low output efficiency" (EX1018, ¶¶[0003]-[0004]).

- Xu (EX1009): Specifically aims to provide a micro loudspeaker with "high magnetic flux density, high sensitivity, and good overall acoustic performance." EX1009, ¶[0003].
- Nielsen (EX1010): Focuses on creating a "homogenous magnetic flux" to provide for more accurate sound reproduction and reduce distortion. EX1010, 9:20-29.

- Nakada (EX1018): Seeks to provide a "small-sized speaker device with . . . strong electromagnetic force" and improved "output efficiency." EX1018, Abstract, ¶¶[0004], [0016], [0027], [0045].

A POSITA, armed with this knowledge, would not require an express statement that "magnetic is better than piezoelectric" to recognize the advantages of magnetic-driver architectures in bone conduction. Rather, these references demonstrate that magnetic-circuit technology was an active area of acoustic optimization directed toward improved sensitivity, fidelity, efficiency, and miniaturization. A POSITA therefore would have been motivated to incorporate a magnetic-driver architecture such as Fukuda's into the Li-Fujita framework to obtain these known and predictable benefits.

3. Fukuda's "Independent Unit" is Functionally Modular and Offers Independent Benefits

33. In reply to Patent Owner's argument that Fukuda's benefits are tied to its system "as a whole (POR 66), I disagree. Fukuda explicitly teaches that its speaker is "completed as an independent unit . . . allowing it to be incorporated, as it is, in a casing." EX1023, 3:23-28. Fukuda further describes a compact bone-conduction speaker structure directed toward minimized sound leakage, simplified construction, and reduced manufacturing cost. *Id.* A POSITA therefore would have understood Fukuda's driver assembly to be a functionally modular transducer unit suitable for incorporation into wearable consumer-electronic platforms such as Li's

headset and compatible vibration-transmission structures such as those disclosed by Fujita. Incorporating Fukuda's magnetic-driver unit into the Li-Fujita framework would have represented a routine engineering application of known modular speaker technology to obtain predictable acoustic and manufacturing benefits.

D. Ground 4: The Li-Fujita-Numata Combination Renders Claims 7–10 Obvious

34. Dr. Scordilis opined that the Petition's Li-Fujita-Numata combination would result in "unwearable and unusable configurations." Scordilis, ¶¶157-164 at 162; *see also* POR 67. I disagree.

35. Dr. Scordilis's opinion assumes that Numata's exact assembly orientation and release geometry would be incorporated into Li without modification. Numata, however, broadly teaches detachable modular connector structures with elastic locking, stable retention, and removable earhook assemblies. EX1007, ¶¶[0031]-[0034]. Numata further teaches that the earhook assembly may be inserted from above or below to configure the headset for either the left or right ear. *Id.* If a particular orientation were undesirable in a specific implementation, a POSITA would have understood that the connector structure was adaptable and not "permanently unusable," as Dr. Scordilis alleges. Scordilis, ¶¶158, 163. A POSITA further would have recognized that routine engineering techniques—such as keyed or asymmetric geometries, side-access release structures, or modified latch

arrangements—would readily prevent incorrect insertion or simplify assembly. Numata's reversible insertion capability further demonstrates the flexibility and adaptability of its modular connector structure.

36. Moreover, I disagree with Dr. Scordilis's opinion that Numata's plug would become "permanently" stuck because Li's housing lacks Numata's through-hole. *See* Scordilis, ¶¶157-163 at 162; *see also* POR 67-73. A POSITA would recognize that Numata's through-hole is merely one example of a release mechanism for a snap-fit connection—not a functional requirement of the plug itself. Li's housing can readily incorporate other standard, releasable locking mechanisms that do not require a through-hole, such as a resilient cantilever latch accessible from the exterior, a spring-loaded detent, or a flexible barb that compresses upon pulling. These alternatives were well-known in the art of portable electronic device assembly. A POSITA seeking to combine Numata's bi-directional plugging with Li's waterproof earphone would adapt the release mechanism accordingly—a routine design choice.

37. Potential assembly issues concerning Numata would have represented, at most, an ordinary implementation detail readily addressed through routine engineering techniques for achieving the undisputed benefits of the Numata plug end. A POSITA would have combined the teachings of Li-Fujita-Numata given the undisputed benefits of secure fit and improved wear resistance.

38. Dr. Scordilis opined that a POSITA would not have combined Numata with Li-Fujita because Numata's plugs do not provide electrical connectivity to Li's housing. Scordilis, ¶¶165-169; *see also* POR 73-75. I disagree. A POSITA would have understood that Numata's plugs provide electrical connectivity in multiple ways. For example, a POSITA would have understood that Numata's detachable insertion interface shown in Figures 8 and 9 could readily accommodate electrical connections if desired. Numata already discloses a hollow through-hole structure (65, 65A) and insertion part (47) configured for detachable modular assembly and repeated insertion. EX1007, Figs. 8-9, ¶¶[0031]-[0034]. Once the mechanical alignment and detachable retention structures are provided, incorporating conventional conductive elements—such as conductive pins, spring contacts, conductive sleeves, or routed wires—would have represented routine connector engineering well within the ordinary skill in the art.

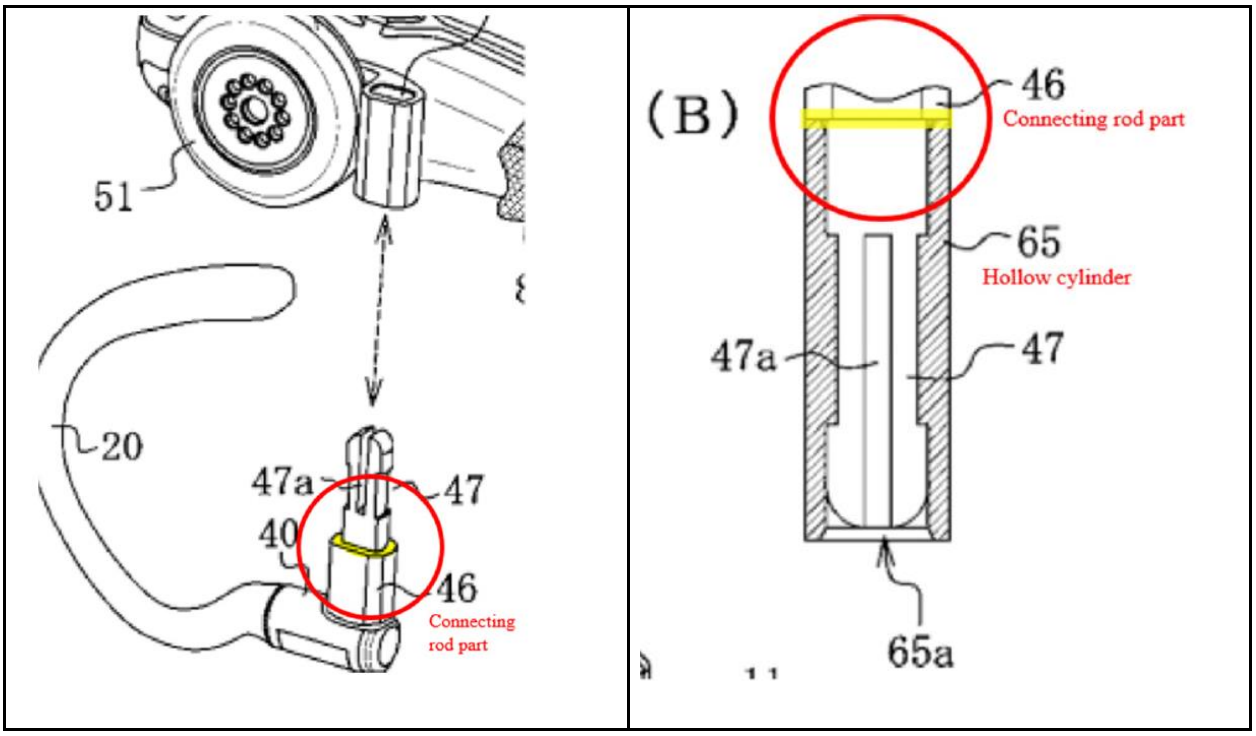
39. Dr. Scordilis's opinion assumes that Numata's exact release-tool geometry is incorporated into Li's inline connector arrangement without modification. Numata's relevant teaching, however, is the use of detachable elastically locking modular connector structures. EX1007, ¶¶[0031]-[0034]. A POSITA would have readily understood that the particular placement of a release opening or release mechanism is a routine engineering detail that would be adapted for an inline configuration using known connector techniques, including side-

access release slots, flexible latch structures, removable covers, or alternative manual release mechanisms. The fact that one particular disassembly approach illustrated in Numata may require geometric adaptation when incorporated into Li does not render the combination inoperable or beyond ordinary skill.

40. Dr. Scordilis opined that Numata does not teach each element of claim 9. Scordilis, ¶¶170-173; *see also* POR 75-78. I disagree. Claim 9 states the inserting portion of the plug end to be *partially inserted* into the socket, and that the exposed part of the inserting portion has an annular surface "spaced apart" from the outer end surface of the core housing. EX1001, 37:55-60 (claim 9). Claim 10 depends from claim 9 and adds a condition, "when the core housing and the first plug end are fixed." *Id.*, 37:61-67. Figure 6 of the '582 patent shows the plug end *completely* plugged and fixed within the socket, not *partially inserted* into the socket.

41. A POSITA would have understood that when the Numata plug is partially inserted into a socket, the yellow highlighted surface of the connecting rod part 46 (i.e., the exposed portion) is arranged in a stepped manner to form an annular table surface that is close to, and spaced apart from, the outer end surface of the hollow cylinder 65 (i.e., the core housing). EX1007, Figs. 9 and 8(B) (excerpt) (annotated) (shown below)). A POSITA would have understood that, even when the Numata plug is fixed to the socket as in FIG. 8(b), the yellow

highlighted surface is "spaced apart" from the outer end surface of the hollow cylinder 65 (i.e., the core housing), e.g., to accommodate typical manufacturing tolerances and permit reliable installation.



EX1007, FIGS. 9, 8(B) (annotated)

42. Dr. Scordilis opines that Li-Fujita-Numata does not disclose element 10[b]. Scordilis, ¶¶174-177; *see also* POR 78-79. I disagree. A POSITA would have understood Li teaches an arrangement comprising a protective sleeve that elastically abuts against the core housing to realize sealing. A POSITA would have understood Li teaches a protective sleeve of the ear hook interacting with elastic coating layer 1132 over the core housing to realize even further sealing. EX1004, ¶¶[0036], [0058], FIGS. 2, 3, 5, 9, 10.

IV. ACKNOWLEDGMENTS

43. I declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I, Chris Kyriakakis, declare under penalty of perjury under the laws of the United States of America that the foregoing is true and current.

Chris Kyriakakis

Executed on 05/18/2026