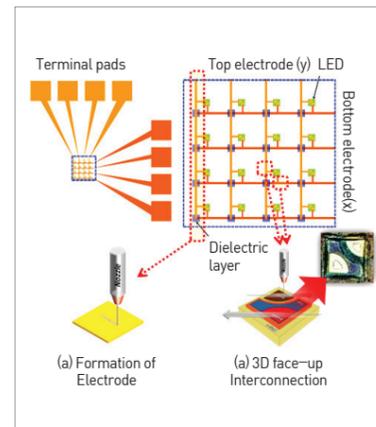


A Core Technology for Fine Metal Formation Targeting for Flexible/Stretchable Device and Display

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- ⇒ Developing a new concept for High device performance/high flexibility
The formation of Fine metal patterns($\leq 100 \mu\text{m}$)for FHE(flexible hybrid electronics) and the fabrication of 3D step height metal interconnection
- ⇒ DI(direct imaging) technology for creating non-damaging fine pattern($\leq 100 \mu\text{m}$)/pitch($\leq 20 \mu\text{m}$) for stretchable device and display

Client / Market

- Technical field for FHE (flexible hybrid electronics)
- Technical field for DI (direct imaging) fine pattern/pitch formation for non-damaging flexible/stretchable display areas

Necessity of this Technology

- When using existing mass production MEMS Fab. process/equipment, the process cannot be performed if there is step height ($\geq 5 \mu\text{m}$) between the substrate and the thin chip (equipment / process compatibility issue).
- In forming 3D interconnection, wire-bonding creates mechanical damage of less than $50 \mu\text{m}$ to the thin chip due to heat, pressure, and ultrasonic energy.
- Absence of face-up 3D metal interconnection technology to fabricate fine pattern ($\leq 100 \mu\text{m}$) pitch ($\leq 20 \mu\text{m}$)
- Absence of technology that can form flexible/stretchable pattern without damaging low Tg flexible/stretchable substrate (wiring printing and sintering technology)
- Therefore, to overcome such problems, it is necessary to develop DI type non-damaging fine pattern/pitch creation technology.

Technical Differentiation

- Technology to effectively form 3D interconnection masklessly without causing mechanical damage to the thin chip with thickness below $50 \mu\text{m}$ mounted on the flexible/stretchable substrate
- Technology to create fine pattern ($\leq 100 \mu\text{m}$)/pitch ($\leq 20 \mu\text{m}$) with the DI (direct imaging) method
- Technology to sinter ink material on the flexible/stretchable substrate without thermal damage
- Technology for intrinsically/geometrically robust metal pattern formation for stretchable display
- Technology to rework and repair for mass production yield improvement

DESIRED PARTNERSHIP

Technology Transfer

Licensing

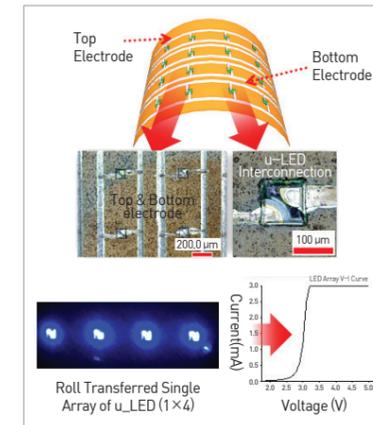
Joint Research

Other



TECHNOLOGY READINESS LEVEL [TRL]

Research, basic explanation | Project concept or idea development | Technology idea verification | Prototype development | Trial product production/evaluation in similar environment | Pilot field demonstration | Development and optimization of commercial model | Commercial product demonstration | Mass production and initial market launch



Excellence of Technology

- Formation of $100 \mu\text{m} \times 100 \mu\text{m}$ (thickness= $5 \mu\text{m}$) micro-LED top & bottom electrodes and securing face-up 3D metal interconnection (line width $\leq 30 \mu\text{m}$)
- Securing DI micro metal pattern method when line width is below $10 \mu\text{m}$
- Establishment of database by ink material for overcoming 3D step height in the flat ($0 \mu\text{m}$) to $50 \mu\text{m}$ area
- Securing sample production technology for micro step height (flat ($0 \mu\text{m}$) to $50 \mu\text{m}$) control for DI process and ink property evaluation
- Performance of laser sintering test for non-damaging ink sintering on polymer substrate

Current Intellectual Property Right Status

PATENT

- Wearable Dry Patch Type Hybrid Substrate and Manufacturing Method (KR1756847)
- Non-penetrating, Superhydrophobic Polyimide Film Manufacturing Method (KR1641207)
- Elastic Device Manufacturing Method and Elastic Device Manufactured with the Method (KR2017-0133265)
- Electrode Pattern Formation Using Laser Sintering and Electrode Pattern Formation System for the Method (KR2017-0060814)

KNOW-HOW

- Non-damaging, DI fine pattern/pitch formation technology
- Face-up 3D step-covered metal interconnection technology
- Intrinsically/geometrically flexible or stretchable metal formation technology
- Repair and maskless process technology for yield improvement