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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* NOBUHARU OHSAWA, HIDEKO INOUE, and SATOSHI SEO<sup>1</sup>

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Appeal 2015-007581  
Application 11/986,949  
Technology Center 2800

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Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and  
MICHAEL G. McMANUS, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1–6, 9–14, 17–22, and 25–30. We have jurisdiction pursuant to 35 U.S.C. § 6(b).

We REVERSE.

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<sup>1</sup> According to the Appeal Brief, the real party in interest is Semiconductor Energy Laboratory Co., Ltd. (App. Br. 4).

## BACKGROUND

Appellants' invention relates to light-emitting devices using a light-emitting element having a phosphorescent compound. (Spec. ¶ 1.)

According to the Specification, "the HOMO level or the LUMO level is deep" means that the energy level is low, and "the HOMO level or the LUMO level is shallow" means that the energy level is high. (Spec. ¶ 42.)

Claim 1 is reproduced below from the Claims Appendix to the principal Brief:

1. A light-emitting device comprising:
  - a hole transporting layer and an electron transporting layer between a first electrode and a second electrode;
  - a light-emitting layer between the hole transporting layer and the electron transporting layer,
    - wherein the light-emitting layer includes a first organic compound having a hole-transporting property, a second organic compound having an electron transporting property, and an organometallic complex,
    - wherein the first organic compound, the second organic compound, and the organometallic complex are mixed with each other,
    - wherein a central metal of the organometallic complex is an element belonging to one of Group 9 and Group 10,
    - wherein a ligand of the organometallic complex has a pyrazine skeleton,
    - wherein a LUMO level of the organometallic complex is deeper than a LUMO level of the first organic compound and a LUMO level of the second organic compound by 0.2 eV or more, and
    - wherein a HOMO level of the organometallic complex is located between a HOMO level of the first organic compound and a HOMO level of the second organic compound.

The Examiner maintains, and Appellants appeal, the rejection of claims 1–6, 9–14, 17–22, and 25–30 under 35 USC § 103(a) as unpatentable over Inoue et al. (US 2005/0221123 A1, published Oct. 6, 2005) (“Inoue”), Seo et al. (US 2005/0260440 A1, published Nov. 24, 2005) (“Seo”), and Shi et al. (US 6,465,115 B2, issued Oct. 15, 2002) (“Shi”).

### OPINION

The dispositive issues on appeal are: Did the Examiner reversibly err in determining that the combination of Inoue, Seo, and Shi would have suggested a light-emitting device comprising a ligand of the organometallic complex having a pyrazine skeleton as required by independent claim 1 and an organometallic complex represented by a general formula (G1) and (G4), which each have a ligand with a pyrazine skeleton as required by independent claims 9 and 17; and did the Examiner reversibly err in determining that the combination of Inoue, Seo, and Shi would have suggested a LUMO level of the organometallic complex which is deeper than a LUMO level of the first by 0.2 eV or more as required by independent claims 1, 9, and 17?

After review of the respective positions provided by Appellants and the Examiner, we agree with Appellants that the Examiner did not establish that the combination of Inoue, Seo, and Shi would have suggested a light-emitting device comprising an organometallic complex having a pyrazine skeleton as required by independent claim 1 and an organometallic complex represented by a general formula (G1) and (G4), which each have a ligand

with a pyrazine skeleton as required by independent claims 9 and 17.<sup>2</sup> We also agree with Appellants that the Examiner did not establish that the combination of Inoue, Seo, and Shi would have suggested a LUMO level of the organometallic complex which is deeper than a LUMO level of the first by 0.2 eV or more as required by independent claims 1, 9, and 17.

The Examiner found Inoue teaches a light-emitting device comprising a light emitting layer (LEL) comprising “a first organic compound **112** having hole-transport properties (e.g. Paragraph **[0132]**), a second organic compound **115** having electron-transport properties and made of the materials claimed and having an excitation energy smaller than the organometallic complex (e.g. Alq<sub>3</sub>, see Paragraph **[0135]**) and an organometallic complex **113**” as required by claims 1, 9 and 17. (Final Act. 3.) The Examiner recognized Inoue did not teach an organometallic complex formed by mixing the first organic compound, the second organic compound which exhibits a LUMO level of the organometallic complex which is deeper than a LUMO level of the first by 0.2 eV or more. (*Id.*) The Examiner found Seo describes mixing together an organometallic complex, a hole-transporting organic compound, and an electronic transporting organic compound. (*Id.* at 4.) The Examiner determined it would have been obvious to mix the organometallic complex, a hole-transporting organic compound and an electron transporting organic compound to enhance mobility and prolong service life. (*Id.*) The Examiner found that Shi teaches making a hole-transporting layer of an anthracene derivative to enhance electroluminescent (EL) performance. (*Id.*)

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<sup>2</sup> The statement of the rejections on appeal appear in the August 21, 2014 Final Office Action.

Appellants argue that claim 1 requires a ligand of the organometallic complex having a pyrazine skeleton and claims 9 and 17 require an organometallic complex as represented by a general formula (G1) and (G4), respectively, which each have a ligand with a pyrazine skeleton. Appellants argue that Alq<sub>3</sub> relied upon by the Examiner, does not have a ligand with a pyrazine skeleton and therefore, does not read on the feature of the organometallic complex of the claimed invention. (Reply Br. 5–6.)

We agree with Appellants that the Examiner's rejection cannot be sustained. The Examiner has failed to provide an adequate explanation why the cited prior art teaches or suggests a ligand of the organometallic complex that has a pyrazine skeleton as required by independent claim 1 or an organometallic complex as represented by a general formula (G1) and (G4) having a ligand with a pyrazine skeleton as required by independent claims 9 and 17. Since the Examiner has failed to establish that the combination of Inoue, Seo, and Shi teaches or suggests the organometallic complex required by independent claims 1, 9, and 17, the Examiner has also failed to establish that the cited prior art would have suggested a LUMO level of the organometallic complex which is deeper than a LUMO level of the first organic compound by 0.2 eV or more as required by independent claims 1, 9, and 17.

Thus, the Examiner has not established that the relied-upon disclosures are sufficient to support obviousness of the Appellants' claimed binder. *See In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967) (“A rejection based on section 103 clearly must rest on a factual basis, and these facts must be interpreted without hindsight reconstruction of the invention from the prior art”). Accordingly, we reverse the rejection.

Appeal 2015-007581  
Application 11/986,949

We reverse the appealed prior art rejection.

REVERSED