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Paper 17
Date: May 19, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

NANOCO TECHNOLOGIES LTD.,
Patent Owner.

IPR2021-00186
Patent 8,524,365 B2

Before ERICA A. FRANKLIN, GRACE KARAFFA OBERMANN, and CHRISTOPHER M. KAISER, *Administrative Patent Judges.*

OBERMANN, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

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I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Petitioner") filed a Petition requesting an *inter partes* review of claims 1–23 of U.S. Patent No. 8,524,365 B2 (Ex. 1001, "the '365 patent"). Paper 1 ("Petition" or "Pet."). Nanoco Technologies Ltd. ("Patent Owner") filed a Preliminary Response to the Petition. Paper 12 ("Prelim. Resp."). With our authorization, Petitioner filed a Reply (Paper 14, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 15, "Sur-reply"). For purposes of this Decision, we accept the parties' contentions regarding real parties in interest.

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2020). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For reasons explained below, we determine that Petitioner shows a reasonable likelihood of prevailing with respect to at least one challenged claim. Accordingly, we institute *inter partes* review of all challenged claims based on all grounds asserted in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019)[1] ("The Board will not institute on fewer than all claims or all challenges in a petition.").

[1] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

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At this preliminary stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or any factual or legal issue underlying the patentability inquiry. Any final determination shall be based on the full trial record. Any argument not raised by Patent Owner in a timely filed response to the Petition, or as permitted in another manner during trial, shall be deemed waived, even if it was presented in the Preliminary Response. Nothing in this Decision represents an invitation for Petitioner to supplement the information presented in the Petition.

A. Related Matters

The parties identify litigation involving the '365 patent as a related matter: *Nanoco Technologies Ltd. v. Samsung Electronics Co., Ltd.*, No. 2:20-cv-00038 (E.D. Tex.) ("District Court case"). Pet. 71; Paper 6, 1.

The parties also identify, as related matters, petitions for review filed in connection with four other patents asserted in the District Court case: IPR2021-00182 for U.S. Patent No. 9,680,068, IPR2021-00183 for U.S. Patent No. 7,588,828, IPR2021-00184 for U.S. Patent No. 7,803,423, and IPR2021-00185 for U.S. Patent No.7,867,557. Pet. 71; Paper 6, 1–2.

B. The '365 Patent (Ex. 1001)

The '365 patent relates to "[a] nanoparticle comprising a molecular cluster compound and a core semiconductor material disposed on the molecular cluster compound." Ex. 1001, 20:9–13. The semiconductor material, in turn, "comprises one or more elements not comprised within the molecular cluster compound." *Id*. The nanoparticle may be prepared by a process that employs at least two precursor species in a nanoparticle precursor composition – "a first precursor species containing a first ion to be incorporated into the core semiconductor material and a separate second

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precursor species containing a second ion to be incorporated into the core semiconductor material." *Id*. at 20:54–62.

The Specification states, "There has been substantial interest in the preparation and characterization" of compound semiconductors that include "particles with dimensions in the order of 2–100 [nanometers] (nm)." *Id.* at 1:21–25. That interest "mainly" may be "due to their size-tunable electronic, optical, and chemical properties and the need for the further miniaturization of both optical and electronic devices." *Id.* at 1:26–28. The Specification indicates that such nanoparticles may be useful in a "range" of "commercial applications," including "biological labelling, solar cells, catalysts, biological imaging, [and] light-emitting diodes." *Id*. at 1:29–31.

The Specification describes the preparation of two different molecular cluster compounds. *Id*. at 15:5–31. The Specification further includes nine examples for preparing nanoparticles; eight involve a core that comprises cadmium and selenium, and one involves a core that comprises cadmium and tellurium. *Id*. at 15:33–19:4.

C. Challenged Claims

Petitioner challenges independent claim 1 and dependent claims 2–23 of the '365 patent. Independent claim 1, set forth below, is illustrative of the claimed subject matter.

> 1. A nanoparticle comprising a molecular cluster compound and a core semiconductor material disposed on the molecular cluster compound, wherein the semiconductor material comprises one or more elements not comprised within the molecular cluster compound.

Ex. 1001, 20:9–13.

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D. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claims Challenged	35 U.S.C. §	Reference(s)
1, 7–12, 17, 22, 23	102	Banin[2]
1, 7–12, 15–17, 22, 23	103(a)[3]	Banin
2–6, 18–21	103(a)	Banin, Herron[4]
13, 14	103(a)	Banin, Treadway[5]
1–9, 17–23	103(a)	Zaban,[6] Farneth,[7] Yu[8]
1, 2, 4, 7–12, 17, 18, 22, 23	103(a)	Lucey,[9] Ahrenkiel[10]

[2] Banin et al., WO 03/097904 A1, published Nov. 27, 2003 ("Banin," Ex. 1005).

[3] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the '365 patent issued has an effective filing date prior to March 16, 2013, the pre-AIA version of § 103 applies.

[4] Herron et al., *Crystal Structure and Optical Properties of $Cd_{32}S_{14}(SC_6H_5)_{36}\cdot DMF_4$, a Cluster with a 15 Angstrom CdS Core*, 259 SCIENCE 1426–1428 (1993) ("Herron," Ex. 1016).

[5] Treadway et al., U.S. Patent No. 6,815,064 B2, issued Nov. 9, 2004 ("Treadway," Ex. 1015).

[6] Zaban et al., *Photosensitization of Nanoporous TiO_2 Electrodes with InP Quantum Dots*, 14 Langmuir 3153–3156 (1998) ("Zaban," Ex. 1006).

[7] Farneth et al., *Bulk Semiconductors from Molecular Solids: A Mechanistic Investigation*, 4 CHEM. MATER. 916–922 (1992) ("Farneth," Ex. 1009).

[8] Yu et al., *Heterogeneous Seeded Growth: A Potentially General Synthesis of Monodisperse Metallic Nanoparticles*, 123 J. AM. CHEM. SOC. 9198–9199 (2001) ("Yu," Ex. 1010).

[9] Lucey et al., US 7,193,098 B1, issued Mar. 20, 2007 ("Lucey," Ex. 1011).

[10] Ahrenkiel et al., *Synthesis and Characterization of Colloidal InP*

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