

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.

IPR2021-00184
Patent 7,803,423 B2

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

FRANKLIN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

This is a Final Written Decision in an *inter partes* review of claims 1–16 and 21–25 (“the challenged claims”) of U.S. Patent No. 7,803,423 B2 (Ex. 1001, “the ’423 patent”). We have jurisdiction under 35 U.S.C. § 6 and enter this Decision pursuant to 35 U.S.C. § 318(a). For the reasons set forth below, we determine that Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner”) have not shown, by a preponderance of the evidence, that the challenged claims are unpatentable.

A. Procedural History

Petitioner filed a Petition requesting an *inter partes* review of the challenged claims. Paper 1 (“Petition” or “Pet.”). Petitioner supported the Petition with the Declaration of Mark A. Green, Ph.D. (Ex. 1002). Nanoco Technologies Ltd. (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 12. Pursuant to our authorization, Petitioner filed a Reply (Paper 14) and Patent Owner filed a Sur-reply (Paper 15).

On May 19, 2021, pursuant to 35 U.S.C. § 314(a), we instituted trial to determine whether any challenged claim of the ’423 patent is unpatentable based on the grounds raised in the Petition. Paper 17 (“Inst. Dec.”). The following table sets forth the grounds asserted for the challenged claims:¹

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the application from which the ’423 patent issued has an effective filing date prior to March 16, 2013, the pre-AIA version of §§ 102 and 103 applies.

Claims Challenged	35 U.S.C. §	Reference(s)
1–3, 10, 11, 13, 22–24	102	Banin ²
1–6, 10–14, 21–25	103(a)	Banin
7–9	103(a)	Banin, Bawendi ³
1, 10–16, 21–24	103(a)	Zaban, ⁴ Ptatschek ⁵
4–6, 25	103(a)	Zaban, Ptatschek, Yu ⁶
7–9	103(a)	Zaban, Ptatschek, Bawendi
1, 4, 11–16, 21, 25	103(a)	Lucey, ⁷ Ahrenkiel ⁸

After institution of trial, Patent Owner filed a Patent Owner Response to the Petition. Papers 25, 26 (collectively, “PO Resp.”).⁹ Patent Owner

² Banin et al., WO 03/097904 A1, published Nov. 27, 2003 (“Banin,” Ex. 1005).

³ Bawendi et al., US 6,576,291 B2, issued June 10, 2003 (“Bawendi,” Ex. 1014).

⁴ Zaban et al., *Photosensitization of Nanoporous TiO₂ Electrodes with InP Quantum Dots*, 14 LANGMUIR 3153–3156 (1998) (“Zaban,” Ex. 1006).

⁵ Ptatschek et al., *Quantized Aggregation Phenomena in II-VI Semiconductor Colloids*, 102 PHYS. CHEM. 85–95 (1998) (“Ptatschek,” Ex. 1008).

⁶ 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).

⁷ Lucey et al., US 7,193,098 B1, issued Mar. 20, 2007 (“Lucey,” Ex. 1011).

⁸ Ahrenkiel et al., *Synthesis and Characterization of Colloidal InP Quantum Rods*, 3 (6) NANO LETTERS 833–837 (2003) (“Ahrenkiel,” Ex. 1012).

⁹ Patent Owner filed Paper 25 (unredacted Patent Owner Response) under seal and Paper 26 (redacted Patent Owner Response) in the public record. Patent Owner filed a Motion to Seal directed, in part, to Paper 25. Paper 27. Petitioner filed a Response to that motion. Paper 29. Thereafter, the parties filed a joint motion to withdraw the motion to seal based, in part, on their agreement that the Patent Owner Response does not need to be sealed because it does not contain confidential information. Paper 30. We granted

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supported the Patent Owner Response with the Declaration of Brandi Cossairt, Ph.D. Ex. 2030.

Petitioner filed a Reply to the Patent Owner Response, Paper 32 (“Pet. Reply”), along with a Second Declaration of Mark A. Green, Ph.D. (Ex. 1093). Patent Owner filed a Sur-reply to Petitioner’s Reply. Paper 39 (“PO Sur-reply”).

On February 23, 2022, the parties presented arguments at an oral hearing. Paper 43.¹⁰ The hearing transcript has been entered in the record. Paper 46 (“Tr.”).

B. Real Parties-in-Interest

Petitioner identifies Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. as real parties-in-interest. Pet. 69. Patent Owner identifies Nanoco Technologies Ltd. as a real party-in-interest. Paper 6, 2.

C. Related Matters

Petitioner and Patent Owner provide notice of a district court litigation involving the ’423 patent: *Nanoco Technologies Ltd. v. Samsung Electronics Co., Ltd.*, No. 2:20-cv-00038 (E.D. Tex.) (the “District Court case”). Pet. 66; Paper 6, 2. The parties further identify petitions for the 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, IPR2021-00185 for U.S. Patent No. 7,867,557, and IPR2021-00186 for U.S. Patent No. 8,524,365. Pet. 69; Paper 6, 2–3.

the motion. Paper 42. Therefore, the unredacted Patent Owner Response (Paper 25) is unsealed and part of the public record of this proceeding.

¹⁰ Although we held a consolidated hearing for this case, IPR2021-00182, IPR2021-00183, IPR2021-00185, and IPR2021-00186, these cases are not consolidated. See Papers 43, 46.

D. The '423 Patent

The '423 patent is directed to the conversion of a nanoparticle precursor composition into nanoparticles, where “[t]he conversion is effected in the presence of a molecular cluster compound under conditions permitting seeding and growth of the nanoparticles.” Ex. 1001, [57]. The Specification discloses that “[t]here has been substantial interest in the preparation and characterisation, because of their optical, electronic and chemical properties, of compound semiconductors consisting of particles with dimensions in the order of 2-100 nm” and such particles are “[o]ften referred to as quantum dots and/or nanocrystals.” *Id.* at 1:11–15. The Specification explains that this interest in quantum dots is “mainly due to their size-tuneable electronic, optical and chemical properties and the need for the further miniaturization of both optical and electronic devices.” *Id.* at 1:15–22. The Specification describes prior “bottom up techniques” to produced quantum dot but states that “early routes applied conventional colloidal aqueous chemistry, with more recent methods involving the kinetically controlled precipitation of nanocrystallites, using organometallic compounds.” *Id.* at 1:23–29, 2:52–56.

With regard to its invention, the Specification describes

a method of producing nanoparticles comprising effecting conversion of a nanoparticle precursor composition to the material of the nanoparticles, said precursor composition comprising a first precursor species containing a first ion to be incorporated into the growing nanoparticles and a separate second precursor species containing a second ion to be incorporated into the growing nanoparticles, wherein said conversion is effected in the presence of a molecular cluster compound under conditions permitting seeding and growth of the nanoparticles.

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