UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MOMENTIVE PERFORMANCE MATERIALS INC.,
Petitioner

v.

GRANT INDUSTRIES INC,
Patent Owner

Case IPR2026-00498
U.S. Patent No. 12,337,057

DECLARATION OF RICHARD J. SPONTAK, Ph.D., Dr.h.c.

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B. Claim 9: "The cosmetic and personal care composition of claim 8, further comprising a water phase and an oil phase." 55

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D. Claim 12: "The cosmetic and personal care composition of claim 8, wherein the composition is a foundation, a lotion, a cream, a shampoo, a serum, or a lip care formulation." 59

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I, Richard J. Spontak, hereby declare as follows.

I. INTRODUCTION

1. I am over the age of eighteen and competent to make this declaration.

2. I have been retained as an expert witness on behalf of Momentive Performance Materials Inc. for the above-captioned *inter partes* review (IPR). I am being compensated for my time in connection with this IPR at my standard consulting rate, which is $800 per hour.

3. I understand that this Declaration accompanies a petition for IPR involving U.S. Patent No. 12,337,057 ("the '057 patent") (EX1001), which resulted from U.S. Patent Application No. 18/066,105 ("the '105 application"), filed on December 14, 2022. I understand that the '057 patent alleges a priority date of August 30, 2019. I refer to this date throughout this declaration.

4. In preparing this Declaration, I have reviewed the '057 patent and each of the documents cited herein, in light of general knowledge in the art before August 30, 2019. In formulating my opinions, I have relied upon my experience, education, and knowledge in the relevant art. In formulating my opinions, I have also considered the viewpoint of a person of ordinary skill in the art ("POSA") (*i.e.*, a person of ordinary skill in the field of cosmetic, personal care, and gel compositions, as defined further below in Section V) prior to August 30, 2019. I understand from counsel that Dr. Sumerlin, an expert in the field of polymer

chemistry, testifies that the claims of the ’057 patent are not entitled to a priority date earlier than December 14, 2022, because none of the applications to which the ’057 claim priority benefit describe the full scope of the elastomer recited in claims 1-17. That said, for purposes of my obviousness opinions in this declaration, I have applied a priority date of August 30, 2019, and have based my opinions on the level of ordinary skill and general knowledge in the art as of that date.

5. I also understand from counsel that Dr. Sumerlin testifies in these proceedings regarding what a POSA would have known vis-à-vis polyurethane elastomer formation, and opines that a POSA would have understood both the ’924 Publication (EX1007) and Schüwer-573 (EX1008) to disclose cross-linked polyurethane elastomers, as recited in claim 1 of the ’057 patent.

II. MY BACKGROUND AND QUALIFICATIONS

6. I am a Distinguished Professor of Chemical & Biomolecular Engineering, Professor of Materials Science & Engineering and Alumni Distinguished Graduate and Undergraduate Professor at North Carolina State University (NCSU) in Raleigh, North Carolina. I hold a B.S. degree in Chemical Engineering from Pennsylvania State University and a Ph.D. in Chemical Engineering from the University of California at Berkeley. I have also been awarded an honorary doctorate (*doctor honoris causa*, Dr.h.c.) from the Norwegian University of Science & Technology. I currently serve on the

Executive Committee Member of the American Chemical Society Polymeric Materials: Science & Engineering (ACS-PMSE) Division, and I have previously served on the Board of Directors of the ACS-Rubber Division. I have served as the Student Chapter Advisor and the Research Triangle Park Alumni Chapter Director and President of the *Tau Beta Pi* Engineering Honor Society, and my term on the Board of Directors of the *Sigma Xi* Scientific Research Honor Society will commence on June 1, 2026. I have been elected Fellow of the Institute of Materials, Minerals and Mining, the Royal Society of Chemistry, the Society of Plastics Engineers, the ACS-PMSE and ACS-POLY Divisions, the American Physical Society, and the Institution of Chemical Engineers. I am an elected member of the Norwegian Academy of Technological Sciences, as well as a member of the American Association for the Advancement of Science and the Materials Research Society.

7. I have extensive experience in the formulation and analysis of cosmetics, personal care products, and a wide variety of gels, including their composition.

8. In 1983, I obtained a B.S. degree in Chemical Engineering from the Pennsylvania State University. Subsequently, I obtained a Ph.D. in Chemical Engineering from the University of California at Berkeley. My dissertation focused on self-assembling block copolymers as thermoplastic elastomers and advanced

electron microscopy methods. I received several national awards for my research.

9. After obtaining my doctoral degree, I conducted research as a Research Scholar in the Department of Materials Science & Metallurgy at the University of Cambridge (UK). There, I investigated the liquid crystalline behavior and crystallization of thermotropic copolyesters. I then performed research as a Research Fellow in Soft Condensed-Matter Physics at the Institute for Energy Technology, where I examined the morphologies of randomly-coupled multiblock copolymers using small-angle neutron scattering (SANS).

10. From 1990 to 1992, I worked as a Staff Scientist in the Corporate Research Division of the Procter & Gamble (P&G) Company. While there, I maintained three primary responsibilities: (1) design new polymeric materials of both scientific and technological interest, (2) develop new microscopy techniques to study problems of relevance to P&G, and (3) collaborate with P&G groups from around the world to solve technical problems related to products. In this latter role, I was exposed to a wide range of functionalized polymers and polymer coatings, as well as cosmetics, personal-care products, food products, and cellulose-based products. I developed expertise in a variety of physical and chemical gel formulations, as well as biopolymers and their blends. From 1992 to 1997, I was employed as an Assistant Professor of Materials Science & Engineering at NCSU. In 1997 (to 2002), I was promoted (with tenure) to Associate Professor of

Chemical Engineering and Materials Science at Engineering at NCSU. Beginning in 2002, I was again promoted to Professor of Chemical Engineering and Materials Science at Engineering at NCSU. I concurrently hold titles as an Alumni Distinguished Undergraduate Professor at NCSU since 2001, an Alumni Distinguished Graduate Professor at NCSU since 2015, and a Distinguished Professor of Chemical and Biomolecular Engineering at NCSU since 2016. As of this year, I am also an Adjunct Professor of Chemistry. In 2012, I also held a visiting appointment as the internationally competitive Lars Onsager Professor at the Norwegian University of Science and Technology, and I have held several other visiting professorships and fellowships at universities around the world, as listed in my CV (EX1005).

11. At NCSU, my primary research focuses on employing, and in some cases developing, complementary microscopy and scattering techniques to probe the structural characteristics of microstructured polymers, nanostructured polymers and polymer (nano)composites, many of which are either multifunctional or stimuli-responsive or both.

12. My research has led to over 300 peer-reviewed journal publications, about 40 works such as book chapters and invited monographs, and 11 issued patents, of which several relate to cosmetic, personal care, and gel compositions. As shown in my CV (EX1005), my publications on these topics include:

- Wells, K.M., et al., "Nanoengineered Binetworks in Multifunctional Anionic Block Polymer Mesoblends for Improved Mechanical Properties," *Adv. Funct. Mater.*, in press (2026);
- Wells, K.M., et al., "Uptake Kinetics and Photocrosslinking of Poly(ethylene glycol) Diacrylate in the Nanostructure of a Self-Assembled Sulfonated Pentablock Polymer," J. Colloid Interface Sci., 714, 140168 (2026);
- McFeaters, F.E. and Spontak, R.J., "Fundamental Principles and Emerging Opportunities for Selectively-Solvated Block Copolymer Networks in Nonpolar Media: A Perspective," Adv. Phys. Res. (invited), 3, 2400027 (2024);
- Jin, S.-A. and Spontak, R.J., "Fundamentals of and Advances in Nanocellulose and Nanochitin Systems," Adv. Ind. Eng. Polym. Res., 6, 356 (2023);
- Yan, J., et al., "Network Topology and Stability of Homologous Multiblock Copolymer Physical Gels," J. Chem. Phys., 153, 124904 (2020);
- Tuhin, M.O., et al., "Microphase-Separated Morphologies and Molecular Network Topologies in Multiblock Copolymer Gels," Macromolecules, 51, 5173 (2018);
- Tuhin, M.O., et al., "Molecular-Level Description of Constrained Chain Topologies in Multiblock Copolymer Gel Networks," J. Chem. Phys., 148,

231101 (2018).

13. Over the course of my career, I have received a variety of awards and recognition for my research. From NCSU, these include 2022 Alexander Q. Holladay Medal for Excellence (the highest faculty honor at NCSU), the 2022 R.J. Reynolds Tobacco Company Award for Excellence in Teaching, Research and Extension (the highest engineering honor at NCSU), the Alcoa Foundation Engineering Achievement and Distinguished Engineering Research Awards, and the Alumni Association Outstanding Research Award. In addition, I have received the ACS-PMSE Division 2006 Cooperative Research Award in Polymer Science and Engineering and 2022 Roy W. Tess Award in Coatings, the German Society for Electron Microscopy 2007 Ernst Ruska Prize, the ACS-Rubber Division 2008 Chemistry of Thermoplastic Elastomers Award, the Institute of Materials, Minerals, and Mining (IOM3) 2011 Colwyn Medal and 2024 Medal for Excellence, the Norwegian University of Science & Technology 2012 Lars Onsager Medal, the Society of Plastics Engineers 2015 International Award, the Society of Polymer Science (Japan) 2022 International Award, the Institution of Chemical Engineers (IChemE) 2022 Global Awards Winner (Research Project of the Year) and 2023 Underwood Medal, the *Sigma Xi* 2025 Walston Chubb Award for Innovation, and the *Acta Materialia* 2025 Hollomon Award for Materials and Society. My research has been highlighted on over 30 journal and book covers.

14. I have frequently performed peer review of research manuscripts for academic journals, such as *Science*, *Nature*, *Nature Materials*, *Advanced Materials*, and *Physical Review Letters*. I have served as the Editor-in-Chief of the *Journal of Encapsulation and Adsorption Science* and the *Open Colloid Science Journal*, as well as Associate Editor of *Advances in Nano Research* and *Coatings*. I have also served on the Editorial Advisory Board for numerous international journals including *Polymers*, *ACS Sustainable Chemistry and Engineering*, *Macromolecules*, *Langmuir*, *Macromolecular Rapid Communications*, *Macromolecular Chemistry and Physics*, *Scientific Reports*, and *Materials Today*.

15. In addition to my educational training and my professional and research experience, I have kept abreast of the field of cosmetics, personal care, and gel compositions by reading scientific literature, conferring with colleagues in the field, and attending and presenting lectures at scientific conferences. I have delivered technical presentations at over 250 national or international conferences on topics including elastomer and gel compositions, and I have given over 200 invited seminars on these topics at universities around the world.

16. Accordingly, I am an expert in the field of formulation science, with experience solving a variety of technical problems related to the development of multicomponent polymeric systems, including cosmetics and personal care and gel compositions. Prior to August 30, 2019, a formulation scientist of ordinary skill in

this field would have had substantial familiarity with the formulation and processing of elastomer-based cosmetics, personal care products, as well as gel compositions. For that reason, I am qualified to provide opinions regarding what a skilled person would have understood, known, or concluded before August 30, 2019.

III. SUMMARY OF OPINIONS

17. It is my opinion that claims 8–12 of the ’057 patent are anticipated by U.S. Patent Publication No. 2021/0059924 (“the ’924 Publication”; EX1007). I understand from counsel that claims 8-12 are not entitled to a priority date earlier than December 14, 2022. Because it is my understanding from counsel that claims 1-17 are not entitled to a priority date earlier than December 14, 2022, the ’924 publication, published March 4, 2021, qualifies as prior art. The ’924 Publication discloses cross-linked polyurethane elastomers formed from polyesters and multi-functional triisocyanate crosslinkers, as well as cosmetic and personal care compositions comprising those elastomers and carrier fluids. EX1007, ¶¶[0031]–[0032], [0293], [0304], [0311]–[0313]. The ’924 Publication further discloses gel and emulsion systems, including compositions containing water and oil phases, actives such as vitamins and sunscreens, and finished formulations such as creams, foundations, lip products, and shampoos, thereby satisfying the limitations of claims 8–12. EX1007, ¶¶[0017], [0031], [0035], [0254], [0310]–[0316].

18. It is further my opinion that the disclosures of the ’924 Publication are enabling with respect to claims 8–12. The ’924 Publication provides detailed working examples describing the preparation of polyurethane elastomers, their conversion into gels, and their incorporation into finished cosmetic compositions using routine formulation techniques that were well within the level of ordinary skill in the art prior to August 30, 2019. EX1007, ¶¶[0297]–[0316].

19. It is my opinion that claims 8–17 of the ’057 patent would have been obvious to a person of ordinary skill in the art (“POSA”) in view of Schüwer-573, Patil, and Vervier. I understand from counsel that Schüwer-573 discloses cross-linked, bio-based polyurethane elastomers derived from dimer-acid polyesters and isocyanate crosslinkers. EX1008, ¶[0011]. I also understand from counsel that Dr. Sumerlin has testified that Schüwer-573 discloses cross-linked polyurethane elastomers, as recited in claim 1 of the ’057 patent. Patil describes the widespread use of polyurethanes in cosmetic and personal care formulations and identifies industry motivations to transition toward silicone-free and bio-based materials. EX1009, 17-18, 20-21. Vervier demonstrates the well-established use of elastomeric particles in cosmetic compositions, including gels, creams, and foundations, to achieve predictable sensory, rheological, and functional properties. EX1010, 66-70.

20. A POSA would have been motivated to combine the teachings of

Schüwer-573, Patil, and Vervier to substitute known polyurethane elastomers for silicone elastomers in cosmetic formulations, in view of the perceived environmental impact, and recognized cost and performance considerations, and would have had a reasonable expectation of success in doing so. Such substitution represents a predictable application of known elastomer chemistries in well-understood formulation contexts.

21. It is further my opinion that the additional limitations recited in claims 13–17—including gel compositions, micronized elastomer particles having particle sizes within the claimed ranges, and viscosities within the claimed range—were well known in the art and represent routine optimization of formulation parameters. Vervier in particular discloses elastomer particle sizes and viscosities squarely within the claimed ranges, and such properties were understood to be result-effective variables that a POSA would have selected using routine experimentation. EX1010, 66, 69-70, FIG. 1.

22. I am not aware of any objective indicia of non-obviousness that would alter my conclusions.

IV. DOCUMENTS CONSIDERED

23. In formulating my opinions, I have considered all the references and documents cited herein, including those listed below.

Exhibit No.	Description
1001	U.S. Patent No. 12,337,057 to Croom et al., issued June 24, 2025 ("the '057 Patent")
1002	File History of U.S. Patent No. 12,337,057 B2 ("'057 Patent File History")
1005	*Curriculum Vitae* of Richard J. Spontak, Ph.D., Dr.h.c.
1007	U.S. Patent Application Publication No. 2021/0059924 A1 to Croom et al., published March 4, 2021 ("the '924 Publication")
1008	European Patent Application Publication No. EP 2853573 A1 to Schüwer et al., published April 1, 2015 ("Schüwer-573")
1009	Patil et al., "Cosmetic Science and Polymer Chemistry: Perfect Together," Chapter 2 of *Polymers for Personal Care and Cosmetics*, Patil et al., eds. (2013) ("Patil")
1010	Vervier et al., "Masking Wrinkles and Enhancing Skin Feel with Silicone Elastomer Powder," *Cosmetics & Toiletries*, 121(11):65-74 (November 2006) ("Vervier")
1011	Burnett et al., "Final Report of the Safety Assessment of Methylisothiazolinone," *International Journal of Toxicology*, 29(Supplement 3):187S-213S (2010) ("Burnett")
1012	Simon et al., "Establishing Standards on Colors from Natural Sources," *Journal of Food Science*, 82(11):2539-2553 (2017) ("Simon")
1013	Liles et al., "Silicone Elastomeric Particles in Skin Care Applications," Chapter 11 of *Polymeric Delivery of Therapeutics*, Morgan et al., eds. (2010) ("Liles")
1014	O'Lenick Jr., A., *Silicones for Personal Care*, 2nd Ed. (2008) ("O'Lenick")
1015	Li, Y., "Bio-based poly(urethane urea) dispersions: chemistry, colloidal stabilization and properties," Doctoral Dissertation, Technische Universiteit Eindhoven (2014) ("Li 2014")

Exhibit No.	Description
1016	Lligadas et al., "Plant Oils as Platform Chemicals for Polyurethane Synthesis: Current State-of-the-Art," *Biomacromolecules*, 11:2825-2835 (2010) ("Lligadas")
1017	Khanderay et al., "Fully biobased polyester polyols derived from renewable resources toward preparation of polyurethane and their application for coatings," *Journal of Applied Polymer Science*, 47558 (2019) ("Khanderay")
1018	Australian Patent Application Publication No. AU 200075119 A to Nguyen et al., published March 8, 2001 ("Nguyen-200")
1019	U.S. Patent No. 9,815,939 B2 to Smits et al., issued November 14, 2017 ("Smits-939")
1020	European Patent Application Publication No. EP 2957611 A1 to Schüwer et al., published December 23, 2015 ("Schüwer-611")
1021	Lockwood, D., "Siloxanes Unexpectedly Observed In Antarctic Soil and Marine Life," *Chemical & Engineering News*, February 25, 2015 ("Lockwood")
1022	Habil et al., "Biodegredation of Silicones (Organosiloxanes)," *Biopolymers Online*, Steinbüchel, A., ed. (2005) ("Habil")
1023	L'Haridon et al., "Ecodesign of cosmetic formulae: methodology and application," *International Journal of Cosmetic Science*, 40:165-177 (2018) ("L'Haridon")
1024	Anastas et al., "Green Chemistry: Principles and Practice," *Chemical Society Reviews*, 39:301-312 (2010) ("Anastas")
1025	Johnson et al., "Safety Assessment of Cyclomethicone, Cyclotetrasiloxane, Cyclopentasiloxane, Cyclohexasiloxane, and Cycloheptasiloxane," *International Journal of Toxicology*, 30(Supplemental 3):149S-227S (2011) ("Johnson")

Exhibit No.	Description
1026	"Introduction to Cosmetic Emulsions and Emulsification," International Federation of the Societies of Cosmetic Scientists (IFSCC) Monograph No. 4 (1997) ("IFSCC Monograph")
1027	Boeriu, C., "Plants4Cosmetics: Perspectives for plant ingredients in cosmetics," Wageningen UR Food & Biobased Research Report No. 1603 (October 2015) ("Boeriu")
1028	Abdul-Aziz et al., "Cosmetics: Polymers in Delivery of Actives," in *Encyclopedia of Polymer Applications*, Mishra, M., ed. (2019) ("Abdul-Aziz")
1029	U.S. Patent No. 4,987,169 to Kuwata et al., issued January 22, 1991 ("Kuwata-169")
1030	U.S. Patent No. 5,760,116 to Kilgour et al., issued June 2, 1998 ("Kilgour-116")
1031	U.S. Patent Application Publication No. 2010/0184635 A1 to Tollington et al., published July 22, 2010 ("Tollington-635")

V. PERSON OF ORDINARY SKILL IN THE ART

24. As an expert, I have offered opinions throughout this declaration from the perspective of a POSA. I understand that a POSA is a hypothetical person who is presumed to be aware of all pertinent art, who thinks along conventional wisdom in the art, and is a person of ordinary creativity. I also understand the level of a POSA constitutes a prism or lens through which the prior art and the claimed invention are viewed.

25. A POSA in the field of the '057 patent would have been familiar with the scientific literature and skilled in laboratory techniques relevant to the

synthesis, characterization, and formulation of silicone elastomers, polyurethanes, and related polymers. Typically, a POSA would have had a Ph.D. degree in organic chemistry, chemical engineering, materials science, polymer science, or a related discipline, with at least two years of experience in the field. A POSA may also have worked as part of a multidisciplinary team, drawing not only upon his or her own skills, but also upon specialized skills of others to solve technical problems in the field. Here, a formulation scientist having familiarity with cosmetic formulations, personal care products, and gel compositions may have been part of the multidisciplinary team.

VI. LEGAL BASIS FOR MY ANALYSIS

26. In formulating my opinions set forth in this Declaration, I applied the following legal principles:

A. Claim Construction

27. I understand that in an IPR, patent claim terms are given their ordinary and customary meaning as understood by a POSA at the time of the invention, in view of the patent's specification and its prosecution history—unless the patentee has acted as his own lexicographer. I understand that a patentee may act as his own lexicographer when providing definitions in the specification or prosecution history. For example, an inventor may clearly set forth a definition of the claim term in either the specification or prosecution history that is different

from the term's ordinary meaning.

28. I understand that claim 1 is the independent claim in the '057 patent, and that claims 2-17 are dependent claims depending directly or indirectly from claim 1. I understand that a dependent claim contains all limitations (*i.e.*, elements) of the claim(s) from which it depends. Thus, I understand that claims 2-17 contain at least all of the limitations of claim 1.

B. Anticipation

29. I understand that a reference anticipates a claim if it discloses each and every element recited in the claim, arranged in the same manner as in the claims.

30. I understand that the anticipating reference must also enable a POSA to make an embodiment of the claimed invention without the need for undue experimentation in light of the general knowledge available in the art. The factors that I have considered in determining whether a reference discloses an embodiment of a claim in a sufficient manner such that a POSA could have made and used the claimed invention without undue experimentation include: the nature of the invention, the state of the prior art, the level of one of ordinary skill, the level of predictability in the art, the amount of direction provided by the reference, the existence of working examples, and the quantity of experimentation needed to make or use an embodiment of the claims.

C. Obviousness

31. I understand that obviousness must be assessed from the viewpoint of a POSA at the time of the invention (here, before August 30, 2019). I also understand that an obviousness analysis involves determining the scope and content of the prior art; comparing the differences between the claimed invention and the prior art. I understand that, in determining the scope and content of the prior art and ascertaining the differences between the claimed invention, a patent challenger must specify where each element of the claim is found in the prior art.

32. I understand that one way of establishing obviousness is by establishing that a POSA would have had both (i) a reason to modify or combine the teachings of the prior art to achieve the claimed invention and (ii) a reasonable expectation of success in doing so. I understand that the reason to combine prior-art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. And I understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a person of ordinary skill that does not need to be explicit in any reference. I also understand that one cannot use the claims themselves as a roadmap to establish obviousness.

33. I understand that a "reasonable expectation of success" is assessed in

view of the prior art and general knowledge in the art from the viewpoint of a POSA before the relevant date (August 30, 2019), and it does not require an absolute certainty of success. Furthermore, I understand that determining whether the prior art would have suggested to those of ordinary skill in the art to carry out the claimed invention with a reasonable expectation of success must be done after determining that the claimed elements are present in the prior art.

34. I also understand that a combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand that when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a skilled person has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated outcome, then that outcome is likely a product not of innovation, but of ordinary skill and common sense, and therefore is considered obvious according to patent laws.

35. I understand that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable amount, range, or ratio. Further, I understand that where a range of conditions is disclosed in the prior art, a claimed amount, range, or ratio is considered obvious if it overlaps with or is encompassed by what is disclosed in the prior art. I also understand that a range can be disclosed in multiple prior art references instead of

in a single prior art reference.

36. I also understand that, before reaching a conclusion that the claimed invention would have been obvious, one must consider any secondary considerations of non-obviousness if they are available. The secondary considerations of non-obviousness can include evidence of commercial success attributable to the claimed invention, evidence of industry praise for the claimed invention, evidence of a long-felt need that was solved by the claimed subject matter, evidence that others copied the claimed subject matter, or evidence that the claimed subject matter achieved an unexpected, superior result relative to the closest prior art. I understand that such evidence must have a nexus, or causal relationship, to the claimed subject matter beyond what was available in the prior art and must be commensurate in scope with the patent claim(s) at issue.

VII. STATE OF THE ART BEFORE AUGUST 30, 2019[1]

37. I have been asked to provide a summary of the state of the art as it pertains to the ’057 patent. I present below a summary of the knowledge of the art

[1] Although I understand from counsel that the ’057 patent claims are not entitled to a priority date earlier than December 14, 2022, I provide a summary of the state of the art as of August 30, 2019, the earliest filing date listed on the face page of the patent.

before August 30, 2019, with regard to the use of silicone and polyurethane elastomers in cosmetic and personal care formulations.

A. By 2019, silicone elastomers were a staple of premium cosmetic and personal care products.

38. Before August 2019, a POSA would have known that silicone elastomer powders constituted a common ingredient used in cosmetic and personal care products because they created gel-like systems with sensory and visual effects that appealed to consumers. EX1013, 207–208; EX1014, 256–260; EX1010, 65. These silicone elastomers were supplied as particles of cross-linked silicone rubber. EX1013, 212. It was well known that the particle size of the elastomers influences sensory performance: silicone elastomeric particles exhibit optimal sensory effects when formulated with a mean particle size distribution of approximately 2–10 μm. As a result, commercial manufacturing processes for silicone elastomers for use in cosmetics were deliberately designed to achieve elastomer particles within this range. EX1013, 211-212, FIG. 4.

39. The spherical morphology of the silicone elastomers and elastic softness were known to impart the distinctive "ball-bearing" feel associated with premium cosmetic formulations. EX1013, 217. Indeed, silicone elastomer particles were known to "provide an extremely pleasant and likable sensation when applied to skin" and also "provide conditioning effects when applied to hair" because they "can absorb significant quantities of liquids such as oils or emollients and still

retain a non-wet appearance and consistency." EX1013, 208. When used in cosmetic formulations, silicone elastomers are able to absorb oils and sebum. EX1014, 247–248; EX1010. Thus, due to their controlled micron-scale particle size, elasticity, optical properties, and oil absorption capacity, silicone elastomer powders were widely used in skin care for benefits such as "silky feel, delivery of actives, sebum absorption, wrinkle masking, matt finish, and soft focus" effects. EX1013, 215–216; EX1014, 243.

40. Vervier's Formulas 1–3 illustrate typical applications of the use of silicone elastomers in cosmetics: Formula 1 is a water/silicone cream containing 4% silica-coated silicone elastomer powder, which provides wrinkle-masking and a silky, powdery feel. EX1010, 67. Formula 2 is a chocolate mousse facial product that leverages the elastomer's sebum absorption for mattifying and oil control. EX1010, 67-69. Formula 3 is a gel foundation that incorporates 7.1% elastomer powder and achieves a high viscosity of 35,000–40,000 cP, enabling pump dispensing and facile spreadability. EX1010, 68, 70. As is commonly used in cosmetic formulations, the elastomer particles in Vervier's formulas possess a typical particle size of 1–10 microns and impart a "ball-bearing effect when spread on the skin." EX1010, 66, 72, FIG. 1. These properties made silicone elastomers a staple in premium skin care and color cosmetic formulations long before 2019. EX1010, 65–66.

41. Because of their chemically crosslinked network structure, elastomer particles are "insoluble in all solvents, but they are swellable by certain solvents." EX1013, 217; EX1010, 67–68. Here, "certain solvents" refer to those solvents that are chemically compatible with the network-forming polymer. "Due to this swelling behavior and also due to their combined surface area, silicone elastomeric particles can take up moderate quantities of various oils and still remain dry to the touch." EX1013, 217. As a result, these crosslinked elastomer particles "can be used to carry certain oily substances or emollients to skin such as mineral oil, glycerides, fatty esters and sunscreens." EX1013, 217. In fact, Table I below provides a list of "various liquids that are absorbed by several different silicone elastomeric powders and still provide a dry feel." EX1013, 216–217, Table I.

Table I. Absorption of Various Liquids by Different Silicone Elastomer Powders[a]

	Dow Corning® Brand			
Liquid	*9506[b]*	*9701[c]*	*EP-9215[d]*	*EP-9293AL[e]*
Octyl Palmitate	3	1	0.5	0.6
Isopropyl Myristate	5	1.4	0.8	0.6
Mineral Oil	3	1.5	0.6	0.6
Castor Oil	0.5	0.9	0.6	0.4
Sunflower Oil	0.5	0.8	0.5	0.5
Isododecane	2	3	1.5	2
Dow Corning® 245[f]	4	4.1	1.6	2
Water	1	1.1	0.5	0.6
Ethanol	1.3	1.1	0.4	0.4

[a] Values represent g of liquid absorbed per g of powder; composition remains dry to the touch. [b] 9506 is a low hardness particle (Shore A 30). [c] 9701 is a low hardness particle treated with SiO_2. [d] EP-9215 is a higher hardness particle (Shore A 60). [e] EP-9293AL is a low hardness particle coated with Al_2O_3. [f] Dow Corning® 245 is dodecamethylcyclopentasiloxane (D_5).

EX1013, Table I.

42. Consistent with this known swellability, a POSA would have further understood, well before August 30, 2019, that silicone elastomer systems commonly existed as crosslinked networks swollen with low-viscosity silicone fluids. For example, U.S. Patent No. 4,987,169 ("the '169 patent") discloses silicone compositions formed by conducting addition polymerization "in the presence of from 10 to 1,000 parts by weight of low-viscosity silicone oil," such that the polymer network incorporates the oil during formation. EX1029, 2:5–7. The '169 patent further explains that the resulting product is obtained in a state in which "the low-viscosity silicone oil has been incorporated into the

three-dimensional crosslinked structure of the polymer formed," and that such compositions can exist as "powdery, pasty or greasy" materials depending on formulation. EX1029, 1:5–10, 3:1–3. The '169 patent also teaches that subsequent processing (*e.g.*, shear mixing) produces "uniform" silicone elastomer compositions. EX1029, 1:67–2:4; 6:51–62. A POSA would therefore have understood that such materials are elastomer gels swollen by silicone fluids.

43. Similar teachings appear in U.S. Patent No. 5,760,116 ("the '116 patent"). The '116 patent further discloses silicone gel compositions in which a crosslinked elastomer is combined with a low molecular weight silicone oil and processed to form a uniform material, expressly describing "a lightly cross-linked elastomer with a volatile, low molecular weight silicone oil dissolved therein." EX1030, 2:15–17, 8:8–16. The '116 patent also teaches that the elastomer gel may be "slurried in [a] second silicone" and mixed to produce "a uniform liquid" having a specified viscosity. EX1030, 13:1-11. These disclosures reflect the well-established understanding in the art that silicone elastomer compositions included gel-like systems comprised of crosslinked networks swollen with silicone oils.

44. By 2019, it was also well understood that these performance benefits were function-driven and formulation-dependent, arising from predictable interactions between the cross-linked elastomeric network and the surrounding

carrier phase. EX1014, 33. As O'Lenick explains, silicone elastomers were cross-linked materials whose performance depends on "multi-component formulations, wherein interactions occur, which have an effect on the performance of the silicone." EX1014, 33.

B. By 2019, concerns regarding perceived environmental impact and cost pressures drove a shift toward non-silicone based materials.

45. By 2019, a POSA would also have known that the cosmetics and personal care industry had increasingly recognized the need to identify and adopt alternatives to silicone-based materials. Silicone compounds used in cosmetics, lotions, and deodorants had long been scrutinized for their perceived long-term environmental impact and cost. EX1021, 2; EX1008, ¶[0009]; EX1022, 1, 6.

46. References published before 2019 disclosed that synthetic polymers, including silicones, were "characteristic of strong resistance to action of biological factors, and upon their application in practice, they become an extremely inconvenient burden to the environment." EX1022, 1, 6. Indeed, it was reported that there "are no natural, specific mechanisms of decomposition for synthetic polymers in the environment, unless they happen to fit into the degradation routes that exist in the natural world." EX1022, 1. In 2015, researchers detected traces of cyclic siloxanes in Antarctic soil, plants, phytoplankton, and krill, thereby illustrating how these substances can potentially escape into the environment and persist even in some of the world's most isolated regions. EX1021, 2.

47. This concern is compounded by the fact that, when silicone is formulated in an emulsion, "equilibrium exists between silicone on a substrate (fabric, fiber, metal, rubber, hair or skin), and silicone in an emulsion, much of the silicone ends up in the wash water." EX1014, 65. As O'Lenick explains, this results in "a very costly and inefficient use of expensive raw materials," and "gives rise to environmental concerns since the wash water ends up in the sewer." EX1014, 65. By 2019, it was reported that cosmetic products predominantly impact the aquatic environment because, when used by consumers, "a more or less important amount of cosmetic formulae is released to the aquatic environment, in particular for rinse-off products," and such release is considered "dispersive and continuous." EX1023, 165–166. As L'Haridon explains, in assessing potential environmental exposure, cosmetic formulations are assumed to undergo "100% release down the drain" following consumer use, such it was reported that discharge of ingredients into water represented one of the principal contributors to the environmental footprint of rinse-off cosmetic products. EX1023, 165–166.

48. In response to growing concerns regarding the perceived environmental impact of silicone-based materials, the cosmetics industry pushed toward more sustainable and biodegradable products to reduce environmental impact. For example, in 2013 the L'Oréal Group launched the "*Sharing Beauty With All*" program, which included a pillar dedicated to the sustainable innovation

of cosmetic products and committed the company to improving the sustainable performance of all new products introduced by 2020 by "reducing their environmental footprint or providing a social benefit." EX1023, 166. As part of this commitment, L'Oréal identified specific criteria for sustainable innovation, including the "reduction in the aquatic environmental impact of the formula" and the "use of renewable ingredients sustainably sourced or deriving from green chemistry," reflecting an industry-wide shift toward renewable, environmentally responsible cosmetic ingredients. EX1023, 166.

49. By 2019, a POSA would have understood that the biodegradability of cosmetic ingredients was widely recognized as an important consideration in reducing and mitigating any perceived environmental harm associated with cosmetic and personal care products. EX1024, 301; EX1023, 165-166. In fact, L'Haridon disclosed that "[b]iodegradability represents the key process in the removal of organic ingredients from the environment and more particularly from water, sediment and soil." EX1023, 166; EX1024, 302, 307. The use of readily biodegradable ingredients helps significantly reduce the perceived environmental impact of cosmetic products over time. EX1023, 166. Indeed, numerous cosmetic brands have decided to market products identified as "natural, organic, mineral-based, and/or bio-botanical, largely in the hope of increasing market share among groups of consumers with whom such terms resonate positively." EX1009, 18.

50. Furthermore, the personal care industry's move away from silicone-based materials was also driven in part by the high cost associated with these materials. EX1008, ¶[0009]. Indeed, as an example, it was well understood in the art that, although "silicone adhesives are also widely employed as skin friendly adhesives," their use presented significant drawbacks because "the cost associated with silicone based product[s] together with the more complex chemical process required for the synthesis of silicone-based medical tape are the main drawback of those materials." EX1008, ¶[0009]. As Schüwer-573 further explains, "using silicone adhesives also increase[s] production cost due to their handling difficulties," reinforcing the understanding that silicone-based elastomers imposed economic and manufacturing disadvantages that motivated the consideration of alternative materials. EX1008, ¶[0009]. These recognized disadvantages contributed to the industry's transition toward more sustainable, cost-effective, and easier-to-process materials such as bio-based polyurethanes. EX1008, ¶[0009]; EX1014, vii, 65.

51. Thus, prior to 2019, a POSA would have understood that the growing concern over the perceived environmental impact and relatively high cost of silicone-based materials posed recognized drawbacks, and that these factors collectively motivated the search for safer, more environmentally friendly, and biodegradable non-silicone alternatives.

C. By 2019, bio-based polyurethanes were well known silicone-free alternatives in cosmetics and personal care.

52. Prior to 2019, a POSA would have understood that silicone-free and bio-based polyurethanes provided a combination of flexibility, rigidity, and strong adhesion, making them versatile materials suitable for use across a wide range of applications, including fibers, foams, adhesives, coatings, cosmetics, personal care products, and elastomers. EX1015, 2; EX1009, 18, 20-21, 26-27; EX1031, ¶¶[0241]-[0249]; EX1016, 2825. In fact, solvent-based polyurethanes were already being used in "nail products as secondary film formers and also in eye shadow, mascara, foundation and lipstick," whereas aqueous polyurethane dispersions were known to be "used extensively in mascaras, skin care as they form flexible films." EX1009, 20-21.

53. Li 2014 taught that polyurethane products "have been applied in a broad spectrum of applications, ranging from fibers to foams, adhesives, coatings, sealants and elastomers" because of "their excellent adhesion to many substrates and their good chemical resistance." EX1015, 2. The "drive towards more sustainable polymeric materials" sparked "research interest in developing high-performance [polyurethane] products from renewable resources." EX1015, 6. Indeed, companies like CRODA commercialized renewable polyurethane building blocks and applications that relied on polyurethanes, such as PRIPOL™, which include dimer diols derived from vegetable oil, and PRIPLAST™, which is a

polyester of dimer acid and diols also derived from vegetable oil. EX1015, 6-7.

54. A POSA would have understood that prior to 2019, a large number of patents and publications described renewable polyurethanes made from plant oil-based polyols, sugar-based polyols, and amino acid-based diisocyanates. EX1015, 6-7. Patents further described an industry shift away from silicone-based materials toward bio-based polyurethanes derived from renewable sources, such as linoleic acid, and demonstrated that such polyurethane systems could deliver equivalent or superior performance without the use of silicones. EX1018, 2:23-44, 5:36-6:5, 35:24-32; EX1019, 2:6-11; EX1008, ¶¶[0009]-[0011]. For example, Kim disclosed that prior silicone-containing film formers exhibited poor wash-off and inadequate setting action, while polyurethane-based compositions provided excellent flexibility and application properties to hair. EX1018, 2:23-4:46. In addition, there was a well-recognized need and desire to form polyurethanes that could be synthesized from "more renewable biobased components" and "which have equivalent or improved physical properties in comparison to existing polyesters and polyurethanes." EX1019, 2:6-11; EX1008, ¶¶[0009]-[0011].

D. By 2019, silicone-free polyurethane elastomers had been used in a variety of skin-friendly applications, including adhesives, coatings, and drug-delivery devices.

55. In 2015, European Patent Application Publication Nos. 2 853 573 ("Schüwer-573") and 2 957 611 ("Schüwer-611") disclosed polyurethane

elastomer compositions that could be used in skin-friendly adhesives, medical tapes, patches, and a range of non-medical applications such as masking tapes, protective tapes, and temporary bonding of semiconductor elements. EX1008, ¶¶[0011], [0106]-[0117]; EX1020, ¶¶[0166]-[0178]. Both Schüwer-573 and Schüwer-611 emphasized that polyurethane elastomers can be synthesized from renewable, bio-based components and crosslinked to achieve desirable mechanical and adhesive properties, making them suitable for both biomedical and industrial uses. EX1008, ¶¶[0011], [0027], [0090]; EX1020, ¶¶[0023], [0036], [0115]. Schüwer-573 specifically disclosed that the skin-friendly adhesives are "preferably made by using as much as possible of biobased materials." EX1008, ¶[0011]. Schüwer-611 likewise disclosed that the present invention is "preferably made by using as much as possible of bio-based materials." EX1020, ¶[0023]. Furthermore, Schüwer-573 explicitly describes the addition of oil additives to a polycondensate in a cross-linked form (*i.e*., a cross-linked elastomer) and expressly states that the "oil additive may be selected from *any natural or synthetic*, *organic* or mineral oil which is suitable for topical application to the human skin." EX1008, ¶¶[0069], [0088] (emphasis added).

56. In 2017, U.S. Patent 9,815,939 B2 ("the '939 Patent") described bio-based polyurethane elastomers formulated as dispersions, coatings, adhesives, and elastomer compositions, which "can be synthesized from more renewable biobased

components and which have equivalent or improved physical properties." EX1019, 2:6-11, 2:15-20.

57. Thus, a POSA would have understood that by 2019, polyurethane elastomers were a mature and widely adopted silicone-free elastomer class, routinely used in medical and industrial applications due to their flexibility, chemical resistance, and ability to be tailored for specific end uses.

VIII. OVERVIEW OF THE PRIOR ART

A. The '924 Publication (EX1007)

58. U.S. Patent Publication No. 2021/0059924 ("the '924 Publication"), entitled "Bio-Based and Biodegradable Elastomer for Cosmetic and Personal Care," published on March 4, 2021. EX1007, 1. I understand from counsel that because claims 1-17 are entitled to a filing date no earlier than December 14, 2022, the '924 Publication (the published application of the '831 parent application) qualifies as prior art.

59. I understand from counsel that Dr. Sumerlin has reviewed the '924 Publication and explained that the '924 Publication discloses cross-linked polyurethane elastomer gels formed by reacting a polyester with a multi-functional isocyanate crosslinker.

60. The '924 Publication further discloses cosmetic and personal care compositions comprising the cross-linked elastomer and a carrier fluid, including

water-in-oil emulsions, and compositions with actives such as vitamins, sunscreens, plant extracts, fragrances, colorants, and preservatives. EX1007, ¶¶[0031]–[0035], [0254], [0293]-[0295], [0311]–[0316]. The elastomer is incorporated into foundations, lotions, creams, shampoos, serums, and lip care formulations. EX1007, ¶¶[0254], [0311]-[0316]. The gel composition is refined by milling to produce micronized elastomer particles measuring 1–100 microns, preferably less than 60 microns, and the gel possessing a viscosity in the range of 15,000 to 1,000,000 cP. EX1007, ¶¶[0017], [0035], [0295].

B. Schüwer-573 (EX1008)

61. European Patent Application No. 13198936.0 to Schüwer, Nicolas et al., entitled, "Skin Friendly Adhesive," was filed on December 20, 2013, and published on April 1, 2015, as EP2853573 ("Schüwer-573"). EX1008, 1. I understand that Schüwer-573 constitutes prior art.

62. I understand from counsel that Dr. Sumerlin has reviewed Schüwer-573 and explained that Schüwer-573 expressly discloses cross-linked elastomer compositions formed by reacting a polyester (polycondensate) derived from a dimer of fatty acid and a diol with a multi-functional isocyanate crosslinker.

63. Schüwer-573 further discloses that the cross-linked elastomer compositions are used in a wide range of applications, including skin-friendly medical tapes, patches, and drug delivery systems to deliver a broad array of active

pharmaceutical ingredients, such as analgesics, anti-inflammatories, antibiotics, and hormones for topical or transdermal administration. EX1008, ¶¶[0106]-[0117].

C. Patil (EX1009)

64. Patil's chapter, "Cosmetic Science and Polymer Chemistry: Perfect Together," published in 2013, constitutes prior art and provides a detailed discussion of polymer use in cosmetic and personal care formulations. EX1009, 17–18, 20. Patil describes industry trends toward natural, sustainable, and silicone-free ingredients, identifying polyurethanes in particular as versatile film-forming and structural polymers used in products such as foundations, mascaras, eye shadow, skin-care products, and lipsticks. EX1009, 20–21, 26–27. Patil further explains that polyurethane crosspolymers provide strong film formation and can be used to increase viscosity, while delivering functional benefits such as gloss reduction and wrinkle effacement in a manner consistent with consumer demand for bio-based ingredients. EX1009, 16–17, 26.

D. Vervier (EX1010)

65. Vervier, entitled "Masking Wrinkles and Enhancing Skin Feel with Silicone Elastomer Powder," was published in November 2006 and therefore constitutes prior art. Vervier describes the development and multi-functional use of silicone elastomer powders in skin-care and cosmetic formulations. EX1010, 65–70. In particular, Vervier explains that the "aesthetics of silicone elastomers and

their ability to absorb various oils and sebum are the two most important properties" in skin-care applications, and discloses a silicone elastomer cosmetic powder composed of spherical dimethicone/vinyl dimethicone crosspolymer particles, typically about 1–10 μm in size, and optionally coated with silica. EX1010, 65–66. In addition to oil and sebum absorption, Vervier reports that these elastomer powders provide wrinkle-masking benefits and impart the "recognized silicone aesthetics" valued in premium formulations. EX1010, 65-66.

66. Vervier further teaches that the spherical structure of the elastomer particles "gives the powder free-flowing properties without agglomeration" and "makes it possible to incorporate the material into a range of formulations, including hydrogels, without the need for processes or equipment." EX1010, 66. This morphology produces a characteristic "ball-bearing" effect on the skin, resulting in a dry, silky, and lubricating feel. EX1010, 65–66. Vervier's disclosure also highlights the versatility of these materials, including benefits such as wrinkle-masking, sebum control, absorption capacity, shear-thinning behavior, and enhanced viscosity, which enable their use across a wide variety of cosmetic formats. EX1010, 66–70. The following formulas in Vervier illustrate these multi-functional properties of silicone elastomer powders in diverse cosmetic and skin-care applications:

- **Formula 1** is a water/silicone (W/S) skin cream containing 4% elastomer

powder in a carrier fluid, which demonstrated immediate wrinkle-masking effects *in vivo*, improving wrinkles up to 84% for 75% of subjects, with a significant mean decrease in wrinkle appearance of 28%. EX1010, 66-67.

- **Formula 2** is a chocolate mousse formulation developed for facial products with 23% elastomer powder in a carrier fluid, designed for sebum absorption and mattifying effects, and evaluated for oil control performance. EX1010, 66-69.
- **Formula 3** is a gel foundation containing 7.1% elastomer powder in a carrier fluid, which exhibits high viscosity (35,000–40,000 cP) but transforms to a fluid-like texture under shear, allowing easy pump dispensing and smooth, even skin coverage. EX1010, 68, 70.

67. Vervier further details the multifunctional properties of the elastomer powder, including shear-thinning behavior, decreased gloss, reduced tackiness, and improved powdery feel. EX1010, 68-69.

IX. THE ’057 PATENT

68. I understand from counsel that the ’057 patent issued on June 24, 2025, from U.S. Pat. Appl. No. 18/066,105 (“the ’105 application”), filed on December 14, 2022. From the front page of the patent, I understand that the ’057 patent claims priority to U.S. Patent Application No. 16/992,831 (“the ’831 Application”), filed on August 13, 2020, and the ’831 Application claims priority

to two provisional applications: (1) U.S. Provisional Application No. 62/976,015 ("the '015 Provisional") filed on February 13, 2020; and (2) U.S. Provisional Application No. 62/893,968 ("the '968 Provisional") filed on August 30, 2019.

A. The '057 Patent Claims

69. Claim 1 of the '057 patent recites:

> 1. A cross-linked elastomer comprising a reaction product of a polyester and a multi-functional crosslinker, wherein the polyester is an esterified dilinoleic acid or a branched C_{36} dicarboxylic acid/diol copolymer.

EX1001, 24:2-5.

70. Dependent claims 2-17 of the '057 patent recite:

> 2. The cross-linked elastomer of claim 1, wherein the multi-functional crosslinker is polyisocyanate.
>
> 3. The cross-linked elastomer of claim 1, wherein the diol is propanediol or butanediol.
>
> 4. The cross-linked elastomer of claim 1, where in the polyester is greater than 60% by weight of the total weight of the cross-linked elastomer.
>
> 5. The cross-linked elastomer of claim 1, where in the polyester is greater than 75% by weight of the total weight of the cross-linked elastomer.

6. The cross-linked elastomer of claim 1, wherein the cross-linked elastomer is silicone-free.

7. The cross-linked elastomer of claim 1, wherein the branched C_{36} dicarboxylic acid/diol copolymer is dilinoleic acid/propanediol copolymer or dilinoleic acid/butanediol copolymer.

8. A cosmetic and personal care composition comprising the cross-linked elastomer of claim 1 and a carrier fluid.

9. The cosmetic and personal care composition of claim 8, further comprising a water phase and an oil phase.

10. The cosmetic and personal care composition of claim 8, wherein the composition further comprises an active selected from the group consisting of selected from vitamins, sunscreens, plant extracts, fragrances and mixtures thereof.

11. The cosmetic and personal care composition of claim 8, further comprising fragrances, colorants, preservatives, or mixtures thereof.

12. The cosmetic and personal care composition of claim 8, wherein the composition is a foundation, a lotion, a cream, a shampoo, a serum, or a lip care formulation.

13. A gel composition comprising the cross-linked elastomer of claim 1 dispersed in a carrier fluid.

14. The gel composition of claim 13, the cross-linked elastomer is in micronized form.

15. The gel composition of claim 14, wherein the cross-linked elastomer in micronized form has a particle size from 1 to 100 microns.

16. The gel composition of claim 15, wherein the particle size is less than 60 microns.

17. The gel composition of claim 13, wherein the gel has a viscosity ranging from 15,000 cP to 1,000,000 cP.

EX1001, 24:6-48.

X. CLAIM CONSTRUCTION

71. I understand that indefiniteness arguments are not permitted in an IPR, and I therefore do not offer any opinion as to whether the scope of the claim terms is defined with reasonable certainty. I address claims 8-17 of the ’057 patent in this declaration and saw nothing in the ’057 patent that indicates that any terms in those claims should be given any particular meaning other than their plain meaning.

XI. GROUND 1: THE ’924 PUBLICATION ANTICIPATES CLAIMS 8-12.

72. I understand from counsel that Dr. Sumerlin has concluded that claim 1 of the ’057 patent is anticipated by the ’924 Publication. Based on the understanding that the ’924 Publication discloses each and every element of claim 1, I explain below my opinion that claims 8–12 of the ’057 patent, which depend directly or indirectly from claim 1, are likewise anticipated by the ’924 Publication.

A. Claim 8: "A cosmetic and personal care composition comprising the cross-linked elastomer of claim 1 and a carrier fluid"

73. Claim 8 is directed to a cosmetic or personal care composition comprising a cross-linked elastomer of claim 1 and a carrier fluid. The '924 Publication discloses each and every element of claim 8. In particular, the '924 Publication discloses the following:

> Formation of a millable elastomeric rubber than can be converted into a cosmetically elegant and stable gel requires consideration of several physical parameters inherent to the rubber formation. The hardness of the polyurethane rubber is an important factor that determines if it can be readily processed into a gel. If the polyurethane rubber is too hard, the rubber granules will not swell properly or grind into a smooth gel upon processing with an emollient. On the other hand, if the polyurethane rubber is too soft it will not easily process into a gel due to stickiness and lack of swellable granules. Three important factors determine the hardness of the polyurethane rubber.

EX1007, ¶[0031].

74. The '924 Publication further discloses the following:

> First, the ratio of polymer content to carrier fluid is essential to consider to synthesize an optimal polyurethane rubber. The total weight percent of biobased emollients should range between 70-95%, or alternatively between 70-90% in the polyurethane rubber. If too much carrier fluid is used, the density of the elastomeric network will be too low to maintain viscosity. If too little carrier fluid is used, the polymer content may be too dense to properly disperse when milled.

EX1007, ¶[0032].

75. As shown above, the ’924 Publication expressly discloses synthesizing “an optimal polyurethane rubber” by optimizing the “ratio of polymer content to *carrier fluid*.” EX1007, ¶[0032] (emphasis added). The ’924 Publication further discloses that “[f]ormation of a millable elastomeric rubber [that] can be *converted into a cosmetically elegant and stable gel*.” EX1007, ¶¶[0031]-[0032] (emphasis added).

76. Moreover, Example 6 of the ’924 Publication is a process for preparing an elastomer gel containing a volatile cosmetic emollient. EX1007, ¶[0304]. The elastomer gel in Example 6 was made using “Example 1 rubber” EX1007, ¶[0304]. I understand from counsel that Dr. Sumerlin has confirmed that the rubber in Example 1 anticipates claim 1. The elastomer in Example 6 was prepared by mixing the Example 1 rubber with glyceryl triheptanoate and then diluting that mixture with “C9-C12 alkanes.” EX1007, ¶¶ [0304]. The glyceryl triheptanoate and “C9-C12 alkanes” serve as carrier fluids.

77. Thus, the ’924 Publication discloses a cosmetic composition comprising a cross-linked elastomer and a carrier fluid, as recited in claim 8. EX1007, ¶¶[0031]–[0032], [0293], [0304]. Accordingly, the ’924 Publication anticipates claim 8.

B. Claim 9: "The cosmetic and personal care composition of claim 8, further comprising a water phase and an oil phase."

78. Claim 9 is directed to the cosmetic or personal care composition of claim 8, further comprising both a water phase and an oil phase. The '924 Publication discloses each and every element of claim 9. Example 16 is a "W/O Emulsion cream" that incorporates the "Gransense™ elastomer from Example 6." EX1007, ¶¶[0311]–[0312]. As discussed above, the elastomer in Example 6 anticipates claim 8.

79. In Example 16, the oil phase ("Phase A") comprises coco-caprylate/caprate (Cetiol LC), cellulose, starch, silica, a polyglyceryl-based W/O emulsifier, and Gransense™ polyurethane elastomer gel, while the water phase ("Phase B") contains deionized water, together with glycerin, butylene glycol, sodium chloride, and preservatives. EX1007, ¶¶[0311]–[0312], Table 4. To prepare the "W/O emulsion cream containing the Gransense™ elastomer from Example 6," Example 16 discloses combining the "Phase A ingredients from Table 4 in a vessel and mix with a homogenizer at room temperature until a uniform consistency is obtained," combining the Phase B ingredients, and then adding "the Phase B ingredients to Phase A." EX1007, ¶¶[0311]–[0312]. According to the '924 Publication, this formulation demonstrates that "the elastomer of this invention provides broader formulating possibilities in the natural and bio-derived formulation landscapes and will also enable the development of products with

desirable textural and performance profiles," thereby satisfying the "market demand for higher natural content in cosmetic formulas with formulators opting for naturally derived surfactants, emollients, and thickening aids." EX1007, ¶[0311].

80. Example 17 similarly discloses a "Cream-to-Powder Foundation" prepared as a W/O emulsion, again using an oil phase that includes coco-caprylate/caprate and the Gransense™ elastomer gel from Example 6, together with emulsifiers and other cosmetic ingredients (Phase A), and a separately prepared aqueous phase (Phase C) that is incorporated to form the final composition. EX1007, ¶[0313], Table 5. Taken together, Examples 16 and 17 expressly teach cosmetic and personal care compositions of claim 8 further comprising both a water phase and an oil phase.

81. Accordingly, the '924 Publication anticipates claim 9.

C. Claim 10: "The cosmetic and personal care composition of claim 8, wherein the composition further comprises an active selected from the group consisting of selected from vitamins, sunscreens, plant extracts, fragrances and mixtures thereof."

82. Claim 10 is directed to the cosmetic or personal care composition of claim 8, wherein the composition further includes one or more active ingredients such as vitamins, sunscreens, plant extracts, or fragrances. The '924 Publication discloses each and every element of claim 10. Specifically, the '924 Publication discloses that the "elastomeric rubber" "can be converted into a cosmetically elegant and stable gel" and that the gels "can include an optional personal or

healthcare active," including "vitamin C," "Vitamin A," "sunscreen," "plant extract," and "fragrance." EX1007, ¶¶[0031], [0035].

83. Example 15 corresponds to an "SPF-50 sunscreen" made using the elastomer from Example 6 (which anticipates claim 8) along with zinc oxide and titanium oxide, both of which are sunscreens. EX1007, ¶[0310].

84. Accordingly, the '924 Publication anticipates claim 10.

D. Claim 11: "The cosmetic and personal care composition of claim 8, further comprising fragrances, colorants, preservatives, or mixtures thereof."

85. Claim 11 is directed to the cosmetic or personal care composition of claim 8, wherein the composition further includes additional formulation components such as fragrances, colorants, preservatives, or mixtures thereof. The '924 Publication discloses each and every element of claim 11. As discussed above for claim 10, the '924 Publication discloses incorporation of conventional cosmetic additives, including fragrances. EX1007, ¶¶[0035], [0254], Table 7. The '924 Publication also discloses preservatives in the W/O emulsion cream of Example 16 discussed above, where Nipaguard SCM—identified as "Methylisothiazolinone & propylene glycol & sorbitan caprylate"—is used as a cosmetic preservative in the aqueous phase. EX1007, ¶[0312], Table 4; EX1011, 188S.

86. The '924 Publication further discloses a cream-to-powder formulation, described as having "color [that] is fully blended and uniform" in

Example 17 (which includes the elastomer from Example 6), and ingredients including iron oxides (CI 77491/77492/77499) and titanium dioxide, which are commonly used colorants. EX1007, ¶[0313]; EX1012, Table 1-A. The '924 Publication also discloses a lipstick formulation in Example 18 (which includes the Gransense™ Elastomer from Example 6), where D&C Red No. 7, a recognized colorant, is incorporated as an ingredient. EX1007, ¶¶[0314]–[0315]; 21 C.F.R. § 74.1307(a) (D&C Red No. 7).

87. Accordingly, the '924 Publication anticipates claim 11.

E. Claim 12: "The cosmetic and personal care composition of claim 8, wherein the composition is a foundation, a lotion, a cream, a shampoo, a serum, or a lip care formulation."

88. Claim 12 is directed to the cosmetic or personal care composition of claim 8, wherein the composition is in a specific product form, such as a foundation, lotion, cream, shampoo, serum, or lip care formulation. The '924 Publication discloses each and every element of claim 12. The '924 Publication discloses that the elastomer compositions are incorporated into cosmetic products "including … press powders, lotions, creams … body creams, serums, lip care etc." EX1007, ¶[0254]; *see also* EX1007, ¶[0017] ("further aspects of the invention include cosmetics, emulsions, lotions, creams, etc., and products which contain the inventive compositions and gels"). The '924 Publication further provides working examples of these categories, specifically, emulsion creams

(Examples 16), a cream-to-powder foundation (Example 17), lip products (Example 18), and shampoos (Example 19). Examples 18 and 19, each use the elastomer of Example 6, which anticipates claim 8, as discussed above. EX1007, ¶¶[0314]-[0315] and [0316]. These examples therefore disclose the personal care composition of claim 8 as a foundation, a cream, a shampoo, and a lip care formulation. EX1007, ¶¶[0311]–[0316], Examples 16-19.

89. Accordingly, the ’924 Publication anticipates claim 12.

F. The ’924 Publication is an enabling disclosure of a species of claims 8-12 of the ’057 Patent

90. The ’924 Publication provides an enabling disclosure of embodiments of claims 8–12 of the ’057 patent because a POSA reading the ’924 Publication would not have to engage in undue experimentation to make cosmetic and personal care compositions comprising the disclosed cross-linked polyurethane elastomer and a carrier fluid or the same compositions containing a carrier fluid with water and oil phases, actives, and specified product forms.

91. **Nature of the invention, state of the prior art, and relative skill of those in the art:** Claims 8–12 are directed to cosmetic and personal care compositions that incorporate a cross-linked elastomer into carrier fluids and conventional cosmetic formats (*e.g.*, creams, foundations, shampoos, and lip products), optionally including actives, and in some cases including separate water and oil phases. EX1001, claims 8-12. Cosmetic formulation of elastomers,

emulsions, and personal care products was well developed prior to 2019, and a POSA would have been highly skilled in polymer/materials science and cosmetic formulation. *See* Section VII.A. These factors weigh in favor of enablement.

92. **Predictability of the art:** There is a significant amount of information available in the art regarding formulating silicone elastomers into cosmetic and personal care products. *See* Section VII.A. In view of the predictable, formulation-driven considerations disclosed in the ’924 Publication—together with the extensive background knowledge regarding polyurethane elastomers, silicone elastomers, and cosmetic formulation discussed above (Section VII.A), this factor also weighs in favor of enablement.

93. **Amount of direction provided and number of working examples:** The ’924 Publication provides extensive direction and numerous working examples demonstrating how the disclosed cross-linked polyurethane elastomers are formulated into cosmetic and personal care compositions. Examples 1–5 disclose the preparation of cross-linked polyurethane rubber elastomers, which I understand the Dr. Sumerlin has confirmed enable a polyurethane elastomer of claim 1. EX1007, ¶¶[0297]–[0303]. Example 6 then demonstrates converting that polyurethane elastomer (“Example 1 rubber”) into a cosmetically suitable gel by combining it with identified carrier fluids, producing a stable elastomer gel. EX1007, ¶[0304]. Examples 16 and 17 further illustrate incorporation of that

polyurethane elastomer gel into water-in-oil emulsion compositions, disclosing defined oil and water phases, specific cosmetic ingredients, and step-by-step mixing and homogenization procedures to achieve uniform creams and foundations. EX1007, ¶¶[0311]–[0313], Tables 4–5. Example 15 discloses a sunscreen formulation incorporating the elastomer of Example 6 together with sunscreen actives. EX1007, ¶[0310]. Additional examples show incorporation of the polyurethane elastomer gel into a range of finished cosmetic and personal care product formats, including lip products (Example 18) and a shampoo (Example 19), each with specified ingredients and preparation steps. EX1007, ¶¶[0314]–[0316]. Collectively, these working examples provide detailed and practical instruction for preparing polyurethane elastomer gels and formulating them into diverse cosmetic and personal care compositions, strongly supporting enablement.

94. **Quantity of experimentation needed:** The extent of experimentation needed to enable an embodiment of claims 8-12 is not undue because cosmetic and personal care compositions containing elastomers were already known in the art, as discussed above, and claims 8-12 require nothing more than formulating cross-linked polyurethane elastomers using techniques that were well within the ordinary skill of formulation scientists. *See, e.g.*, EX1010, 66-70. Indeed, formulation choices—such as selecting fragrances, preservatives, or colorants, or selecting among the disclosed product forms—represent routine formulation decisions well

within the level of ordinary skill in the art. EX1009, 20-21, 27-34; EX1013, 207–208; EX1014, 256–260; EX1010, 65. Accordingly, this factor weighs in favor of a finding of enablement.

95. Thus, the ’924 Publication provides sufficient detail to enable a POSA to make and use cosmetic and personal care compositions comprising a cross-linked polyurethane elastomer encompassed by claims 8–12—namely, compositions comprising the disclosed cross-linked polyurethane elastomer and a carrier fluid, including embodiments comprising water and oil phases, optional cosmetic actives, and specific claimed product forms—without undue experimentation.

* * *

96. Given the above, the ’924 Publication anticipates claims 8-12 of the ’057 patent.

XII. GROUND 3: CLAIMS 8-17 WOULD HAVE BEEN OBVIOUS OVER SCHÜWER-573, PATIL, AND VERVIER.

97. As discussed in detail below, claims 8-17 of the ’057 would have been obvious over Schüwer-573, Patil, and Vervier. Schüwer-573 published on April 1, 2015, Patil published in 2013, and Vervier published in 2006. A POSA would have been familiar with Schüwer-573, Patil, and Vervier, and they all would have been readily accessible to a POSA. I, therefore, understand that Schüwer-573, Patil, and Vervier qualify as prior art to the earliest claimed filing date of the ’057 patent—

August 30, 2019.

98. A POSA would have had a reason to combine the teachings of Schüwer-573, Patil, and Vervier to arrive at the claimed cosmetic and personal care compositions and gel compositions. As discussed in Section VII.A, silicone elastomers have been used in cosmetic and personal care compositions for decades because they can provide a smooth, silky feel to the skin, provide aesthetic effects, like blurring and soft-focus, and can absorb sebum, leading to a matte finish. EX1013, 207–208, 215-216; EX1014, 256–260. Consequently, silicone elastomers were readily used across numerous product formats: creams, serums, powders, oils, and sunscreens, for example. EX1010, 65-74; EX1013, 215-219.

99. Polyurethanes were recognized as viable, high-performance, and environmentally preferable alternatives to silicones. EX1015, 2-7; EX1009, 18, 20-21; EX1016, 2825-26, 2831; EX1017, 1; EX1018, 2:23-44, 5:36-6:5, 35:24-32. Polyurethanes offered predictable performance benefits such as flexibility and adhesion, as described in both Schüwer-573 and Patil. EX1009, 18, 20-21, 26-27; EX1008, ¶¶[0011], [0027], [0090]. I understand from counsel that Dr. Sumerlin opines that Schüwer-573 discloses each and every element of claim 1 because Schüwer-573 teaches the use of cross-linked polyurethane elastomers. A POSA would have understood that polyurethane elastomers, such as those disclosed in Schüwer-573, could be synthesized from renewable resources to meet

sustainability goals. For example, polyurethane elastomers are considered bio-based when a substantial portion of their molecular building blocks is derived from renewable biological feedstocks. EX1019, 2:6-17, 7:9-16; EX1008, ¶[0011]. And bio-based polyurethane elastomers made from the same ingredients as Schüwer-573—C_{36} dimer acid diols and isocyanates—were well known and used in a wide variety of industries, such as the automotive, furniture, and paint industries. EX1019, 1:23-46, 2:14-27.

100. Patil, and other references discussed above, explains that, by 2019, polyurethanes were well recognized in the cosmetics field as versatile polymers used in foundations, mascaras, eye shadow, skin-care products, and lipsticks, and highlights an industry-wide shift toward bio-based and silicone-free alternatives driven by perceived environmental and cost drawbacks associated with silicones. EX1009, 17-18, 20-21; EX1021, 2; EX1022, 1, 6; EX1014, 65; EX1023, 165–166; EX1024, 301; EX1008, ¶[0009]; EX1018, 2:23-44, 5:36-6:5, 35:24-32. Vervier, in turn, demonstrates the routine use of elastomeric materials—specifically silicone elastomers—in a wide range of cosmetic and personal care formulations, including a water/silicone (W/S) skin cream (Formula 1), a chocolate mousse formulation developed for facial products (Formula 2), and a gel foundation (Formula 3), to achieve predictable functional outcomes such as viscosity control, spreadability, sebum absorption, and desirable sensory effects. EX1010, 66-67. Taken together,

these references would have led a POSA to understand that the elastomer chemistry taught in Schüwer-573 could be applied in the cosmetic formulation contexts exemplified by Vervier, motivated by the industry trends described in Patil and the predictable performance benefits of polyurethanes.

101. A POSA also would have had a reasonable expectation of success in making this combination. Patil disclosed that polyurethanes were already known to be versatile film formers and were used in foundations, mascaras, eye shadow, skin care products, and lipsticks. EX1009, 20-21, 26-27. Vervier disclosed that elastomer-based cosmetic systems were mature and predictable, and that performance characteristics such as gel structure, viscosity, and sensory feel were driven by known formulation variables. EX1010, 66-70. Schüwer-573 disclosed that polyurethane elastomers were already used in skin-friendly medical tapes, patches, and drug delivery systems. EX1008, ¶¶[0106]-[0117]. Following the polyurethane elastomers provided in Schüwer-573 and Vervier's routine use of synthetic elastomers in cosmetic and gel compositions, a POSA would have reasonably expected that substituting the bio-based polyurethane elastomers of Schüwer-573 for the silicone elastomers disclosed in Vervier would yield cosmetic, personal care, and gel compositions with comparable functional and sensory properties.

102. In reaching my opinions regarding the obviousness of claims 8-17, I

considered the possibility of objective evidence (as discussed in Section XII.H below) but did not find any that would support the patentability of the '057 patent claims.

A. Claim 8: "A cosmetic and personal care composition comprising the cross-linked elastomer of claim 1 and a carrier fluid"

103. Claim 8 is directed to a cosmetic or personal care composition comprising a cross-linked elastomer of claim 1 and a carrier fluid. The claimed cosmetic and personal care composition would have been obvious over Schüwer-573, Patil, and Vervier. Vervier's Formula 2 discloses a chocolate mousse facial product formulation containing a silicone elastomer powder and a carrier fluid. EX1010, 70. Specifically, the silicone elastomer powder used in Vervier's Formula 2 is dimethicone/vinyl dimethicone crosspolymer coated with silica (DC 9701 Cosmetic Powder, Dow Corning). EX1010, 70; *see also* EX1010, 67 (describing Formula 2 as a "silica-coated elastomer powder"). The carrier fluid used in Vervier's Formula 2 is cyclopentasiloxane (DC 245 Fluid, Dow Corning). *See* EX1010, 70. Cyclopentasiloxane, a cyclic silicone compound (cyclomethicone), is widely used as a carrier fluid in cosmetic and personal care formulations. EX1025, 219S. Cyclomethicone is a volatile carrier fluid that is insoluble in water and has a low viscosity. EX1025, 151S. Cyclopentasiloxane, in particular, is often used as an emollient and solvent in cosmetic products. EX1025, 153S.

104. As discussed above, a POSA would have had a reason to replace the

silicone elastomers in Vervier with the bio-based polyurethane elastomers in Schüwer-573 in view of the documented market-driven shift away from silicone-based materials due to perceived environmental and recognized cost pressures, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]. A POSA would have also understood that cosmetic products are a subset of personal care products, and cosmetic compositions (e.g., face creams/foundations) constitute personal care compositions.

105. A POSA would have had a reasonable expectation of success in substituting the polyurethane elastomer of Schüwer-573 for the silicone elastomer in Vervier's Formula 2, using cyclopentasiloxane or any natural, bio-based carrier fluid. Schüwer-573 explicitly describes the addition of oil additives to a polycondensate in a cross-linked form (*i.e.*, a cross-linked elastomer) and expressly states that the "oil additive may be selected from *any natural or synthetic*, *organic* or mineral oil which is suitable for topical application to the human skin." EX1008, ¶¶[0069], [0088] (emphasis added). This disclosure in Schüwer-573 demonstrates that the polyurethane elastomer compositions of Schüwer-573 are compatible with a wide range of oils, including cosmetic carrier fluids, thereby supporting the predictability and success of replacing the silicone elastomers of Vervier's Formula 2 with the bio-based polyurethane elastomers of Schüwer-573.

106. Accordingly, claim 8 would have been obvious over Schüwer-573, Patil, and Vervier.

B. Claim 9: "The cosmetic and personal care composition of claim 8, further comprising a water phase and an oil phase."

107. Claim 9 is directed to the cosmetic or personal care composition of claim 8, further comprising both a water phase and an oil phase. The claimed cosmetic and personal care composition would have been obvious over Schüwer-573, Patil, and Vervier. Vervier's Formula 2 discloses a chocolate mousse facial product formulation comprising both a water phase and an oil phase, in addition to a silicone elastomer powder. EX1010, 70. Specifically, Formula 2 includes water together with multiple oils forming an oil phase, including cyclopentasiloxane, (the carrier fluid discussed above for claim 8), sunflower seed oil, cocoa butter, and coconut oil. EX1010, 70. Such multi-phase (oil-in-water or water-in-oil) cosmetic formulations were well known and routinely used in personal care products because they offer multiple benefits, including the "ability to blend immiscible components; reduction of long-lasting unctuousness after application; control of viscosity; lowering of cost by dilution with water; and the ability to control the delivery of actives to the skin." EX1026, 1. Consumers also prefer cosmetic formulations containing emulsions because they "view the opaque characteristics of emulsions as a visual signal that the product is gentle and likely to benefit the skin." EX1026, 1.

108. As discussed above, a POSA would have had a reason to replace Vervier's silicone elastomer in Formula 2 with the bio-based polyurethane elastomers of Schüwer-573 in view of the recognized market-driven shift away from silicone materials due to perceived environmental and recognized cost pressures and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]. A POSA would have been further motivated to retain both the water phase and the oil phase in that formulation, because, as discussed above, emulsions offer multiple benefits in cosmetic formulations. EX1026, 1.

109. A POSA would have had a reasonable expectation of success in substituting the polyurethane elastomer of Schüwer-573 for the silicone elastomer in Vervier's Formula 2 while retaining both the water phase and the oil phase in that formulation. As discussed above, Schüwer-573 expressly teaches the compatibility of its disclosed polyurethane elastomers with essentially any cosmetic oil additive. EX1008, ¶[0088]. Furthermore, Schüwer-573 discloses that the polycondensate (*i.e.*, polyester) "is mixed with the oil additive, a solvent or a mixture of solvents … and the crosslinker." EX1008, ¶[0104]. In other words, Schüwer-573 teaches formulating the cross-linked elastomer with additional solvents commonly used in topical compositions, which includes water. EX1008, ¶[0104]. This substitution is predictable and routine in cosmetic formulation

practice, supported by the disclosures of Schüwer-573 and Vervier's chocolate mousse facial product formulation.

110. Accordingly, claim 9 would have been obvious over Schüwer-573, Patil, and Vervier.

C. Claims 10 and 11: The cosmetic and personal care composition of claim 8, further comprising "an active selected from the group consisting of selected from vitamins, sunscreens, plant extracts, fragrances and mixtures thereof" (claim 10) or "fragrances, colorants, preservatives, or mixtures thereof" (claim 11).

111. Claim 10 is directed to the cosmetic or personal care composition of claim 8, wherein the composition further includes one or more active ingredients such as vitamins, sunscreens, plant extracts, or fragrances. Claim 11 is directed to the cosmetic or personal care composition of claim 8, wherein the composition further includes additional formulation components such as fragrances, colorants, preservatives, or mixtures thereof. Claims 10 and 11 would have been obvious over Schüwer-573, Patil, and Vervier. Vervier's Formula 2 discloses a chocolate mousse facial product formulation that includes a fragrance component, "Chocolat Crème 0310585, Expressions Parfumèes," a plant extract, specifically "*Gardenia tahitensis* flower extract", in addition to a silicone elastomer powder, and a carrier fluid, cyclopentasiloxane. EX1010, 70.

112. As discussed above, a POSA would have been motivated to replace the silicone elastomer in Vervier's Formula 2 with the bio-based polyurethane

elastomers disclosed in Schüwer-573 with a reasonable expectation of success in view of the recognized market-driven shift away from silicone-based materials due to perceived environmental and recognized cost pressures, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]. A POSA would have been further motivated to retain Vervier's fragrance and flower extract components when substituting the polyurethane elastomer of Schüwer-573 for the silicone elastomer because the inclusion of fragrances and plant extracts, such as flower extracts, in cosmetic and personal care compositions was conventional and routinely employed to enhance consumer sensory perception, particularly in facial and skin-applied formulations. *See, e.g.*, EX1027, 20 ("[m]any of the specific sensory notes (e.g. fragrance and colour), functional attributes and bioactive properties of cosmetic products are/can be imparted by active ingredients from plants and plant extracts"). These plant extracts are also added to cosmetic products to satisfy consumer demand for products containing natural ingredients. *See, e.g.*, EX1027, 15 ("[t]he demand for natural ingredients is increasing through growth of the natural cosmetics market, as well as through the increasing use of natural ingredients in 'conventional' cosmetics").

113. A POSA would also have had a reasonable expectation of success in retaining Vervier's fragrance and flower extract components when substituting the

polyurethane elastomer of Schüwer-573 for the silicone elastomer, because Schüwer-573 expressly teaches that the disclosed polyurethane elastomer compositions may include "plant extracts" and "fragrant/refreshing materials." EX1008, ¶¶[[0094], [0113]. This express disclosure confirms that fragrances and plant extracts are fully compatible with the polyurethane elastomer compositions of Schüwer-573 and may be incorporated without adversely affecting formulation stability or performance. Accordingly, the inclusion of a fragrance or plant extract in a cosmetic and personal care composition comprising the polyurethane elastomers of Schüwer-573 represents a predictable and routine formulation choice, fully supported by the disclosures of Schüwer-573 and Vervier.

114. Claims 10 and 11 therefore would have been obvious over Schüwer-573, Patil, and Vervier.

D. Claim 12: "The cosmetic and personal care composition of claim 8, wherein the composition is a foundation, a lotion, a cream, a shampoo, a serum, or a lip care formulation."

115. Claim 12 is directed to the cosmetic or personal care composition of claim 8, wherein the composition is in a specific product form, such as a foundation, lotion, cream, shampoo, serum, or lip care formulation. Claim 12 would have been obvious over Schüwer-573, Patil, and Vervier. Vervier discloses that its elastomer-containing formulations are suitable for facial products. In particular, Vervier clearly discloses a skin *cream* formulation, titled

"Water/Silicone (W/S) *Skin Cream*" in Formula 1, comprising a silicone elastomer together with a carrier fluid. EX1010, 67. The silicone elastomer used in this formulation is a dimethicone/vinyldimethicone crosspolymer coated with silica (DC 9701 Cosmetic Powder, Dow Corning). EX1010, 67; *see also* EX1010, FIG. 1 (describing the formulation as "a silicone elastomer cosmetic powder"). The carrier fluid is cyclopentasiloxane (DC 245 Fluid, Dow Corning). EX1010, 67; *see also* EX1025, 219S. This W/S skin cream was applied directly to the skin of participants to evaluate its wrinkle-masking effect by comparing the participants' crow's-feet before and after application of the skin cream. EX1010, 66.

116. As discussed above, a POSA would have been motivated to replace the silicone elastomers in Vervier's facial formulations with the bio-based polyurethane elastomers of Schüwer-573 in light of the recognized market-driven shift away from silicone-based materials, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]. A POSA would also have had a reasonable expectation of success in formulating the polyurethane elastomers of Schüwer-573 into facial creams as these represent predictable and routine cosmetic formulation choices. Indeed, Patil disclosed that polyurethane polymers were well recognized in the cosmetics field as versatile polymers used in foundations, skin-care products, and lipsticks. EX1009, 17-18, 20-21. A POSA would have reasonably expected that

polyurethane elastomers disclosed in Schüwer-573 could be formulated into a foundation, cream, or lip care formulation in view of the disclosures in Patil and Schüwer-573.

117. Accordingly, claim 12 would have been obvious over Schüwer-573, Patil, and Vervier.

E. Claim 13: "A gel composition comprising the cross-linked elastomer of claim 1 dispersed in a carrier fluid."

118. Claim 13 is directed to a gel composition comprising a cross-linked elastomer of claim 1 dispersed in a carrier fluid. Claim 13 would have been obvious over Schüwer-573, Patil, and Vervier. Vervier discloses several silicone elastomer formulations, including Formula 3, titled "Gel Foundation," which expressly discloses a gel composition in which a silicone elastomer is dispersed in a carrier fluid. EX1010, 72. The silicone elastomer is a dimethicone/vinyl dimethicone crosspolymer coated with silica (DC 9701 Cosmetic Powder, Dow Corning). EX1010, 72. The carrier fluid is cyclopentasiloxane (DC 245 Fluid, Dow Corning). EX1010, 72; *see also* EX1025, 219S.

119. As discussed above, a POSA would have been motivated to replace the silicone elastomer in Vervier's gel foundation Formula 3 with the bio-based polyurethane elastomers disclosed in Schüwer-573 in view of the recognized market-driven shift away from silicone-based materials due to perceived environmental and recognized cost pressures, and the disclosed use of

polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011].

120. A POSA also would have had a reasonable expectation of success in replacing the silicone elastomers with the polyurethane elastomers disclosed in Schüwer-573 to form a gel composition dispersed in a carrier fluid. Schüwer-573 discloses that its cross-linked polyurethane elastomers are gel materials, as evidenced by their high gel content, with the "adhesive gel content value of the cross-linked polycondensate … comprised between 60% to 95%." EX1008, ¶[0087]. Schüwer-573 further discloses that these elastomeric gels are formulated together with oil additives that function as carrier fluids, making the resulting compositions directly analogous to the elastomer-in-carrier-fluid gel foundation Formula 3 disclosed in Vervier. EX1008, ¶[0088]. Thus, a POSA would have understood that the cross-linked polyurethane elastomers of Schüwer-573 are gels that can be formed from dispersing an elastomer in a carrier fluid, in the same manner disclosed in Vervier's Formula 3.

121. Accordingly, claim 13 would have been obvious over Schüwer-573, Patil, and Vervier.

F. Claims 14, 15, and 16: "The gel composition of claim 13, the cross-linked elastomer is in micronized form" (claim 14), "the cross-linked elastomer in micronized form has a particle size from 1 to

100 microns" (claim 15), "the particle size is less than 60 microns" (claim 16).

122. Claim 14 is directed to the gel composition of claim 13, wherein the cross-linked elastomer is present in micronized form. Claim 15 is directed to the gel composition of claim 14, wherein the micronized elastomer has a particle size ranging from 1 to 100 microns. Claim 16 is directed to the gel composition of claim 15, wherein the particle size of the micronized elastomer is less than 60 microns. Claims 14-16 would have been obvious over Schüwer-573, Patil, and Vervier. Vervier expressly discloses that the silicone elastomer used in its gel foundation formulation (Formula 3; discussed above for claim 13) is present in micronized form (*i.e.*, has a particle size in the micrometer range wherein micrometer is synonymous with micron). EX1010, 72. In particular, Vervier explains that the silicone elastomer consists of spherical particles having an average size of approximately 1–10 µm, which falls within both "from 1 to 100 microns" and "less than 60 microns." EX1010, 66, FIG. 1. Vervier further teaches that this spherical structure, with particle sizes represented in microns, "gives the powder free-flowing properties without agglomeration and makes it possible to incorporate the material into a range of formulations, including hydrogels, without the need for processes or equipment." EX1010, 66. Thus, Vervier discloses the advantages of gel compositions comprising micronized cross-linked elastomers.

123. As discussed above, a POSA would have had a reason to replace the

silicone elastomer in Vervier's gel foundation with the bio-based polyurethane elastomers of Schüwer-573 in view of the recognized market-driven shift away from silicone-based materials due to perceived environmental and recognized cost pressures, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011].

124. Moreover, a POSA would have been specifically motivated to micronize the polyurethane elastomers of Schüwer-573 to mirror the particle size and spherical morphology disclosed in Vervier, to mimic the free-flowing behavior, resistance to agglomeration, and the ability to facilitate dispersion into gel formulations without specialized processing that Vervier describes as being advantageous. EX1010, 66. In addition, the particle sizes disclosed by Vervier are typical of cosmetic gel foundations that are applied to and absorbed into the skin. It was generally known that "polymeric microparticles with diameters of 3–10 μm selectively permeate through hair follicles or sweat ducts, whereas particles greater than 10 μm will reside on the skin surface." EX1028, 748. Thus, micronized cross-linked elastomers in the claimed ranges of "1-100 microns" and "less than 60 microns" offer multiple advantages recognized in the art.

125. A POSA also would have had a reasonable expectation of success in providing the polyurethane elastomers of Schüwer-573 in micronized form when substituting them for the silicone elastomer disclosed in Vervier's Formula 3.

Vervier does not describe any difficulty in formulating its elastomers into spherical particles having an average size of approximately 1–10 μm. Schüwer-573 imposes no limitation on the physical form of the cross-linked polyurethane elastomer, nor does it describe any structural or chemical feature that would prevent routine size-reduction or micronized particle formation. Thus, a POSA would have had a reasonable expectation of success in preparing micronized elastomers.

126. Accordingly, claims 14-16 would have been obvious over Schüwer-573, Patil, and Vervier.

G. Claim 17: "The gel composition of claim 13, wherein the gel has a viscosity ranging from 15,000 cP to 1,000,000 cP."

127. Claim 17 is directed to the gel composition of claim 13, wherein the gel composition has a viscosity ranging from 15,000 cP to 1,000,000 cP. Claim 17 would have been obvious over Schüwer-573, Patil, and Vervier. Vervier's Formula 3 discloses a gel composition having a measured viscosity of approximately 35,000 to 40,000 cP, which falls within the viscosity range recited in claim 17. EX1010, 70. Vervier teaches that its high viscosity gel formulation "allow[s] the use of a pump dispenser." EX1010, 69. Vervier further describes that "[t]he thick, creamy gel transforms to a fluid-like texture and is easy to spread for good skin coverage and an even skin tone." EX1010, 69. Thus, Vervier discloses the advantages of high viscosity gel compositions.

128. As discussed above, a POSA would have had a reason to substitute

the silicone elastomer in Vervier's gel foundation with the bio-based polyurethane elastomers disclosed in Schüwer-573 in view of the recognized market-driven shift away from silicone-based materials due to perceived environmental and recognized cost pressures and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]. A POSA would have been further motivated to retain the viscosity of Vervier's gel foundation due to the spreadability benefits described by Vervier. EX1010, 69.

129. A POSA would have had a reasonable expectation of success in achieving viscosities within the claimed range when making this substitution. The viscosities disclosed in Vervier are typical of cosmetic gel formulations designed to balance structural integrity with spreadability, particularly where elastomers are dispersed in volatile carrier fluids such as cyclopentasiloxane. EX1010, 70; *see also* EX1014, 50 ("[h]igh viscosity [compounds are] used to provide soft feel, spreadability and substantivity, and gloss"). Indeed, Vervier discloses that this viscosity is achieved through formulation and processing (*i.e.*, the process of gelation), specifically by combining the ingredients using turbulent mixing at approximately 1400 rpm, homogenizing using high-shear mixer, followed by a reduction in stirring speed, which causes the viscosity of the composition to "rapidly increase." EX1010, 72.

130. Schüwer-573 similarly discloses preparation of its polyurethane

elastomer compositions using routine mixing and homogenization techniques, including stirring speeds of 150–220 rpm, which consistently yield a "colorless viscous solution." EX1008, ¶¶[0122], [0124], [0125]. Moreover, Schüwer-573's Preparative Example 5 discloses manual homogenization of the elastomer composition to form a "clear viscous paste," a description that reflects a composition of even higher viscosity. EX1008, ¶[0126]; *see also* EX1008, ¶[0122] (describing the viscous solution as "colorless"), ¶¶[0124]-[0125].

131. Patil also discloses that polyurethanes are added to formulations to "increase product viscosity." EX1009, 26. Accordingly, in view of Vervier's express disclosure of gel compositions exhibiting viscosities within the claimed range, Schüwer-573's teachings demonstrating the formation of viscous polyurethane elastomer gels, and Patil's disclosure that polyurethanes can increase product viscosity, a POSA would have had a reasonable expectation of success in arriving at the subject matter of claim 17 based on Schüwer-573, Patil, and Vervier.

132. Accordingly, claim 17 would have been obvious over Schüwer-573, Patil, and Vervier.

* * *

133. Given the above, a POSA would have had a reason to combine Schüwer-573, Patil, and Vervier to arrive at the claimed cosmetic and personal

care and gel compositions recited in claims 8-17, with a reasonable expectation of success, notwithstanding secondary indicia as discussed in Section XII.H below. Therefore, claims 8-17 would have been obvious to a POSA.

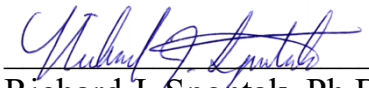
H. No secondary considerations

134. In reaching my opinions regarding obviousness described in this declaration, I considered whether there were any secondary considerations of non-obviousness. As I discuss above, I understand that secondary considerations of non-obviousness can include evidence of commercial success attributable to the claimed invention, evidence of industry praise for the claimed invention, evidence of a long-felt need that was solved by the claimed subject matter, evidence that others copied the claimed subject matter, or evidence that the claimed subject matter achieved an unexpected, superior result relative to the closest prior art. I am not aware of any such secondary considerations of non-obviousness that supports patentability of the ’057 patent claims.

XIII. CONCLUSION

In signing this declaration, I recognize that the declaration will be filed as evidence in an *inter partes* review before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required, I will appear for cross-examination within the United States during the time allotted.

I hereby declare that all statements made herein of my own 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 the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.



Richard J. Spontak, Ph.D., dr.h.c.

Date: 18 September 2026