

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

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 12,337,057**

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PETITIONER'S EXHIBIT LIST

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1001	U.S. Patent No. 12,337,057 B2 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”)
1003	Declaration of Richard J. Spontak, Ph.D., Dr.h.c. (“Spontak Decl.”)
1004	Declaration of Brent Sumerlin, Ph.D. (“Sumerlin Decl.”)
1005	<i>Curriculum Vitae</i> of Richard J. Spontak, Ph.D., Dr.h.c.
1006	<i>Curriculum Vitae</i> of Brent Sumerlin, Ph.D.
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 <i>Polymers for Personal Care and Cosmetics</i> , Patil et al., eds. (2013) (“Patil”)
1010	Vervier et al., “Masking Wrinkles and Enhancing Skin Feel with Silicone Elastomer Powder,” <i>Cosmetics & Toiletries</i> , 121(11):65-74 (November 2006) (“Vervier”)
1011	Burnett et al., “Final Report of the Safety Assessment of Methylisothiazolinone,” <i>International Journal of Toxicology</i> , 29(Supplement 3):187S-213S (2010) (“Burnett”)
1012	Simon et al., “Establishing Standards on Colors from Natural Sources,” <i>Journal of Food Science</i> , 82(11):2539-2553 (2017) (“Simon”)

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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,” <i>Chemical & Engineering News</i> , February 25, 2015 (“Lockwood”)
1022	Habil et al., “Biodegradation of Silicones (Organosiloxanes),” <i>Biopolymers Online</i> , Steinbüchel, A., ed. (2005) (“Habil”)

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1024	Anastas et al., “Green Chemistry: Principles and Practice,” <i>Chemical Society Reviews</i> , 39:301-312 (2010) (“Anastas”)
1025	Johnson et al., “Safety Assessment of Cyclomethicone, Cyclotetrasiloxane, Cyclopentasiloxane, Cyclohexasiloxane, and Cycloheptasiloxane,” <i>International Journal of Toxicology</i> , 30(Supplemental 3):149S-227S (2011) (“Johnson”)
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 <i>Encyclopedia of Polymer Applications</i> , Mishra, M., ed. (2019) (“Abdul-Aziz”)
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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”)
1032	Akindoyo et al., “Polyurethane types, synthesis and applications – a review,” <i>RSC Advances</i> , 6:114453-114482 (2016) (“Akindoyo”)

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1034	Neff et al., “Renewable building blocks for polyurethanes,” <i>Physical Sciences Reviews</i> , 3(8) (June 2018) (“Neff”)
1035	“Amended Safety Assessment of Dialkyl Dimer Dilinoleates as Used in Cosmetics,” Tentative Amended Report for Public Comment, Cosmetic Ingredient Review (June 13, 2018) (“Cosmetic Ingredient Review”)
1036	Biermann et al., “Synthesis of alkyl-branched fatty acids,” <i>European Journal of Lipid Science and Technology</i> , 110:805-811 (2008) (“Biermann”)
1037	“Glossary of Basic Terms in Polymer Science,” <i>Pure and Applied Chemistry</i> , 68(12):2287-2311 (1996) (“IUPAC”)
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1039	Clemitsen, I., <i>Castable Polyurethane Elastomers</i> (2008) (“Clemitsen”)
1040	Qamar et al., “Mechanical and structural behavior of a swelling elastomer under compressive loading,” <i>Materials and Design</i> , 45:487-496 (2013) (“Qamar”)
1041	Ashrafizadeh et al., “Erosive and Abrasive Wear Resistance of Polyurethane Liners,” Chapter 6 of <i>Aspects of Polyurethanes</i> , Yilmaz, F., ed. (2017) (“Ashrafizadeh”)
1042	U.S. Patent No. 8,802,770 B2 to Meltzer et al., issued August 12, 2014 (“Meltzer-770”)
1043	U.S. Patent Application Publication No. 2004/0228821 A1 to Sunkel et al., published November 18, 2004 (“Sunkel-821”)

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1045	Badri, K., “Biobased Polyurethane from Palm Kernel Oil-Based Polyol,” Chapter 20 of Aspects of Polyurethanes, Yilmaz, F., ed. (2017) (“Badri”)
1046	Ball et al., <i>Introduction to Chemistry: General, Organic, and Biological</i> (2011) (“Ball”)
1047	Ertl et al., “An algorithm to identify functional groups in organic molecules,” <i>Journal of Cheminformatics</i> , 9(1):1-7 (June 2017) (“Ertl”)
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1052	U.S. Patent Application No. 16/992,831, filed August 13, 2020 (“the ’831 application”)
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1056	Qin et al., “The effect of a renewable fatty acid derivatives based epoxy diluent on the curing kinetics and thermal properties of epoxy/anhydride systems,” <i>Thermochimica Acta</i> , 614:37-44 (2015) (“Qin”)
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1058	Watts et al., “Segregation and crosslinking in urea formaldehyde/epoxy resins: a study by high-resolution XPS,” <i>Journal of Electron Spectroscopy and Related Phenomena</i> , 121:233-247 (2001) (“Watts”)
1059	Mequanint et al., “Nano-structure phosphorus-containing polyurethane dispersions: synthesis and crosslinking with melamine formaldehyde resin,” <i>Polymer</i> , 44:2631-2639 (2003) (“Mequanint”)
1060	Roesler et al., “Tris-3-(1-aziridino)propionates and their use in formulated products,” <i>Progress in Organic Coatings</i> , 50:1-27 (2004) (“Roesler”)
1061	Xia, Y. & Larock, R., “Castor-Oil-Based Waterborne Polyurethane Dispersions Cured with an Aziridine-Based Crosslinker,” <i>Macromol. Mater. Eng.</i> , 2011, 296, 703-709 (“Xia”)
1062	Kamjornsupamitr et al., “Development of hyperbranched crosslinkers from bio-derived platform molecules for the synthesis of epoxidised soybean oil based thermosets,” <i>RSC Advances</i> , 8:37267-37276 (2018) (“Kamjornsupamitr”)

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1064	O dian, George, Principles of Polymerization, Chapter 2, John Wiley & Sons, 2004 (“O dian”)
1065	U.S. Patent No. 11,534,389 B2 to Croom et al., issued December 27, 2022 (“the ’389 Patent”)
1066	“Safety Assessment of Fatty Acids & Fatty Acid Salts as Used in Cosmetics,” Final Report, Cosmetic Ingredient Review (May 15, 2019) (“FDA”)
1067	“Raw Materials for Flexible Packaging: Fulfilling Your Specific Needs,” Covestro Deutschland AG Brochure (2015) (“Desmodur Brochure”)
1068	POLYSORB ID37 EXP- LAB 3822 Safety Data Sheet, Roquette Frere (March 2011) (“Polysorb Safety Data Sheet”)
1069	Jia et al., “Plasticizers Derived from Biomass Resources: A Short Review,” <i>Polymers</i> , 10(12):1303 (2018) (“Jia”)
1070	U.S. Patent Application Publication No. 2015/0050493 A1 to Yoshie et al., published February 19, 2015 (“Yoshie-493”)

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I. STATEMENT OF PRECISE RELIEF REQUESTED AND REASONS THEREFOR (37 C.F.R. §42.22(A))

Momentive Performance Materials Inc. petitions for *inter partes* review, seeking cancellation of claims 1-17 of U.S. Patent No 12,337,057 (EX1001), assigned to Grant Industries Inc. The challenged claims are unpatentable under 35 U.S.C. §§ 102 and/or 103. This Petition is supported by the declaration of Dr. Brent Sumerlin, Ph.D. (EX1004), an expert in the field of polymer chemistry and the declaration of Dr. Richard Spontak, Ph.D. (EX1003), an expert in the field of cosmetic, personal care, and gel compositions. EX1003, ¶¶1-36, 68-71; EX1004, ¶¶1-36, 59-70; EX1005; EX1006.

II. INTRODUCTION

This Petition demonstrates that claims 1–17 of the '057 patent are unpatentable because they claim nothing more than well-known, silicone-free, polyurethane elastomer technology that was already disclosed, practiced, and optimized in the prior art.

By the claimed priority date, the art had already recognized (i) the widespread use of silicone elastomers in cosmetics and personal care, (ii) a strong industry-wide motivation to replace those materials due to cost and perceived environmental concerns, and (iii) bio-based, silicone-free polyurethanes—particularly those derived from dimerized fatty acids reacted with multi-functional isocyanate crosslinkers—as established alternatives capable of delivering the same

performance characteristics. The prior art not only taught these systems in the abstract, but disclosed specific cross-linked elastomer compositions used in gels, cosmetics, and personal care formulations.

The '057 patent does not describe a new technology; it repackages well-understood chemistry using expansive language, most notably “esterified dilinoleic acid” and “multi-functional crosslinker,” that sweeps in vast and chemically diverse genera. Those terms, however, were introduced late in prosecution and encompass two massive genera that each lack written description in any purported priority application. The priority documents disclose, at most, two esterified dilinoleic acid species and only a single class of multi-functional crosslinker, i.e. multi-functional polyurethane crosslinkers, and do not demonstrate possession of the immense genera now claimed. As a result, the challenged claims are not entitled to any priority date earlier than December 14, 2022, and Grant’s own prior publication (U.S. Patent Publication No. 2021/0059924 (EX1007)) qualifies as anticipatory prior art.

Once properly evaluated against the correct priority date, the claimed subject matter collapses because the '924 Publication discloses cross-linked polyurethane elastomer compositions encompassed by the claims that comprise bio-based polyesters derived from dilinoleic acid reacted with polyisocyanate crosslinkers to form silicone-free elastomers suitable for gels and cosmetic compositions, thereby

anticipating claims 1–17.

Even if the claims were entitled to an August 30, 2019 priority date—they are not—the prior art still renders them unpatentable. Schüwer-573 (EX1008) discloses materially identical silicone-free polyurethane elastomer systems formed from dimer fatty acid polyesters and multi-functional isocyanates, anticipating claims 1–7. And, claims directed to cosmetic and gel compositions (claims 8–17) would have been obvious over Schüwer-573 in view of Patil (EX1009) and Vervier (EX1010). Vervier confirms the routine incorporation of such elastomers into cosmetic formulations, personal care, and gel compositions to achieve known texture and rheological properties, making the claimed compositions a predictable application of prior-art systems. Patil reinforces the motivation by teaching polyurethanes as standard cosmetic film formers and viscosity modifiers. Coupling these disclosures with a market shift from silicone-based products to bio-based products renders claims 1-17 obvious.

In short, the challenged claims attempt to monopolize a field that was already well developed: cross-linked polyurethane elastomers derived from dilinoleic acid polyesters and multi-functional crosslinkers, used as silicone alternatives in cosmetic and gel compositions. The prior art disclosed the same compositions, the same materials, and the same uses.

Accordingly, there is at least a reasonable likelihood that Petitioner will

prevail in showing that claims 1–17 are unpatentable under 35 U.S.C. §§ 102 and 103, and institution is warranted.

III. STATE OF THE ART BEFORE AUGUST 30, 2019¹

A. Silicone elastomers were routinely used in cosmetics and personal care.

Since decades before August 2019, silicone elastomers were a go-to ingredient in premium cosmetic and personal care products because they created gel-like systems with appealing sensory and visual effects, and were prized for their ability to absorb oils and sebum. EX1013, 207-08, 247-48; EX1014, 256-60; EX1010, 65; EX1003, ¶37-44. These materials were supplied as spherical particles of cross-linked silicone rubber, and their particle size was recognized as an important parameter governing sensory performance. EX1013, 211-212; EX1003, ¶¶38-39. Liles explains that silicone elastomeric particles exhibit optimal sensory effects when formulated with a mean particle size distribution of 2–10 µm, and commercial manufacturing processes were deliberately designed to achieve particles within this range. EX1013, 211-12, Fig. 4; EX1003, ¶38. Their spherical morphology and elastic softness were known to impart the distinctive

¹ Although this Petition demonstrates that the '057 patent claims are not entitled to claim priority benefit to August 30, 2019, it nevertheless describes the relevant state of the art as of that date.

“ball-bearing” feel associated with premium cosmetic formulations. EX1013, 217; EX1003, ¶¶38-40. Silicone elastomer powders were widely used in skincare due to their controlled micron-scale size, elasticity, and oil absorption, providing benefits such as silky texture, sebum absorption, wrinkle masking, and soft-focus effects. EX1014, 243, 247-248; EX1013, 215-16; EX1003, ¶39.

Because of their cross-linked network structure, elastomer particles do not dissolve in solvents, but can swell when exposed to certain solvents, allowing them to absorb moderate amounts of oils while maintaining a dry feel and to serve as carriers for emollients such as mineral oils, glycerides, fatty esters, and sunscreens. EX1013, 216-17; EX1010, 67-68; EX1003, ¶41. Consistent with known swellability, silicone elastomer systems were well known as cross-linked networks swollen with silicone fluids, including gel-like compositions formed in the presence of substantial silicone oil, as disclosed in U.S. Patent Nos. 4,987,169 and 5,760,116. EX1029, 1:5-10, 2:5-7, 2:64-3: 3; EX1030, 2:15-17, 13:1-11; EX1003, ¶¶42-43.

By 2019, it was known that the properties of silicone elastomers resulted from known interactions between the elastomeric network and a carrier phase. EX1014, 33; EX1003, ¶44. Indeed, 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; EX1003, ¶44.

B. By 2019, the field was looking for alternatives to silicone-based materials.

By 2019, the cosmetics and personal care industry had become increasingly aware of the need to find alternatives to silicone-based materials. Silicone compounds used in cosmetics and lotions presented concerns for their perceived long-term environmental impact and cost. EX1021, 2; EX1022, 1, 6; EX1008, ¶[0009]; EX1003, ¶45. In 2015, for example, researchers detected traces of cyclic siloxanes in Antarctica, illustrating how these substances can escape into the atmosphere and persist in the environment. EX1021, 2; EX1003, ¶46.

This problem is compounded by the fact that much of the silicone in cosmetic and personal care products is washed away, leading to inefficient use of costly materials and the perception of long-term environmental impact as these compounds enter wastewater streams. EX1014, 65; EX1023, 165–166; EX1003, ¶47. In response, the cosmetics industry pushed toward biodegradable products to reduce its environmental footprint, exemplified by L’Oréal’s 2013 “Sharing Beauty With All” program, which committed to improving the sustainability of all new products by 2020, including through the “use of renewable ingredients sustainably sourced or derived from green chemistry.” EX1023, 166; EX1003, ¶48.

Biodegradability was recognized as a critical factor in minimizing potential environmental harm from cosmetic ingredients. EX1024, 301; EX1023, 165-166;

EX1003, ¶49. As L’Haridon explains, “[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; EX1003, ¶49. Promoting the use of readily biodegradable ingredients helps significantly reduce the environmental impact of cosmetic products over time. EX1023, 166; EX1003, ¶49. Indeed, numerous cosmetics 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 (emphasis in original); EX1003, ¶49.

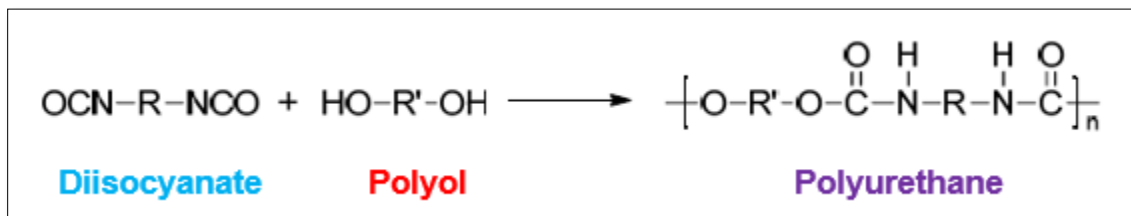
The personal care industry’s move away from silicone-based materials was also driven in part by the high cost associated with these materials. EX1008, ¶[0009]; EX1003, ¶50. It was well-known that the relatively high expense of silicone-based products, combined with the more complex chemical processes required for their synthesis, posed significant drawbacks for their use in adhesives and elastomers. EX1008, ¶[0009]; EX1003, ¶50. These recognized disadvantages contributed to the industry’s transition toward more sustainable, biodegradable materials such as bio-based polyurethanes. EX1008, ¶[0009]; EX1014, vii, 65; EX1003, ¶50.

In sum, by 2019, the perceived persistence and bioaccumulation, and high

cost of silicones were well recognized, driving many to seek safer, more environmentally friendly and biodegradable non-silicone alternatives. EX1003, ¶51. As explained below, the art not only identified this motivation but also taught concrete solutions, including widely used bio-based polyurethane systems.

C. The art taught bio-based polyurethanes as alternatives to silicone-based materials in cosmetics and personal care.

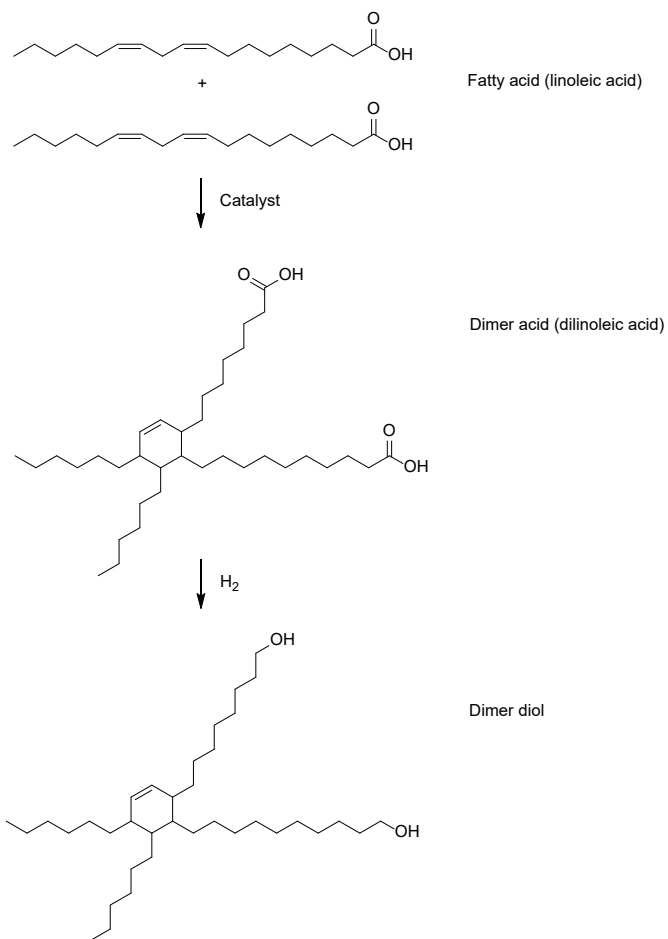
The art recognized that bio-based, silicone-free polyurethanes were viable alternatives to silicone-based materials in cosmetics and personal care. EX1015, 2-7; EX1009, 18; EX1018, 5:36-6:5; EX1003, ¶¶52-54. Polyurethanes are a class of polymers characterized by urethane linkages, typically synthesized from polyols and an isocyanate (-NCO) in the presence of a catalyst. EX1015, 2; EX1032, 114455; EX1033, 66; EX1004, ¶¶37-38.



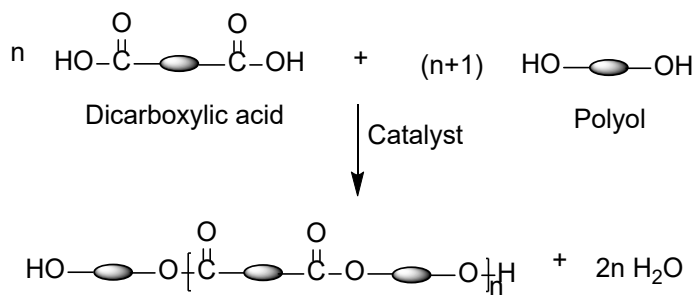
EX1015, Scheme 1-1 (annotated).

Polyurethanes are considered bio-based polymers when the polyol and/or polyisocyanate is synthesized from renewable or natural sources such as vegetable oils. EX1015, 6-7; EX1016, 2825-26; EX1017, 1; EX1004, ¶39. A commonly used feedstock for generating bio-based polyurethanes is linoleic acid derived from

vegetable oils. EX1016, 2831; EX1017, 1; EX1004, ¶39. To create a polyol from a fatty acid such as linoleic acid, the acid first undergoes dimerization to form dimer acids, along with byproducts including trimer fatty acids, oligomeric fatty acids, and residual monomers. EX1034, 7; EX1035, 2-3; EX1019, 4:31-36; EX1036, Abstract; EX1004, ¶40. These dimer acids, which have two long alkyl chains, are then chemically reduced (e.g., by hydrogenation) to convert the carboxylic acid groups into hydroxyl groups, yielding a dimer diol. EX1016, 2831; EX1034, 7; EX1004, ¶40. This dimer diol serves as a renewable polyol that can then be converted to a polyester polyol and then combined with diisocyanates to synthesize cross-linked polyurethanes with sustainable and versatile properties. EX1015, 2; EX1004, ¶41.

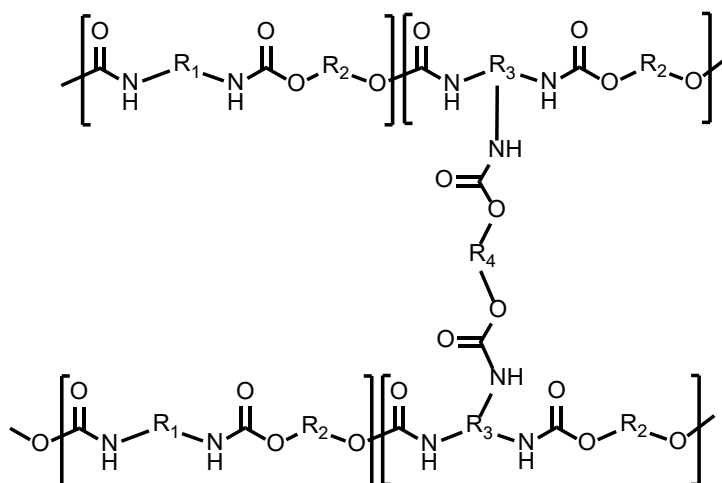


EX1004, ¶41. Alternatively, reacting a dimer acid with a diol yields a dimer-acid/diol polyester that serves as a renewable polyester polyol, which, when combined with polyisocyanates, becomes a cross-linked bio-based polyurethane, as shown below. EX1032, 11455, 114462; EX1015, 2; EX1004, ¶41.



EX1004, ¶41.

By 2019, it was well understood that polymers formed from diacids and polyols can be branched or cross-linked, with branching extending off a main backbone and cross-linking involving at least one branch extending from the main backbone of the polymer linked to another backbone. EX1031, ¶¶[0049]; EX1037, 2297; EX1038, 853; EX1004, ¶42. It was also well known that reacting polyester polyols with polyisocyanates produces polyurethane elastomers through such cross-linking, yielding three-dimensional networked materials (depicted below). EX1039, 218; EX1031, ¶¶[0049]–[0052]; EX1004, ¶43.



The art further recognized that cross-link density directly affects elastomer properties, including modulus, tensile strength, elongation, and elastic recovery. Increased cross-linking generally increases modulus, whereas millable polyurethanes have limited cross-linking and lower chain stiffness, and permanent covalent cross-links improve shape recovery after deformation. EX1039, 8, 126-27; EX1004, ¶44.

Prior to 2019, these silicone-free and bio-based polyurethanes were known to offer a unique combination of flexibility, rigidity, and strong adhesion, making them highly versatile for applications ranging from fibers and foams to adhesives, coatings, cosmetics, personal care, and elastomers. EX1015, 2; EX1009, 18, 20-21, 26-27; EX1031, ¶¶[0241]-[0249]; EX1016, 2825; EX1003, ¶52. Solvent-based polyurethanes were already being used in “nail products as secondary film formers and also in eye shadow, mascara, foundation and lipstick” while aqueous polyurethane dispersions were known to be “used extensively in mascaras, skin care as they form flexible films.” EX1009, 21; EX1003, ¶52. The drive for sustainability led to significant research and commercial development of high-performance polyurethanes from renewable resources, with companies like CRODA introducing products such as PRIPOL™, which are vegetable oil derived dimer diols, and PRIPLAST™, which are polyesters of dimer acid and diols. EX1015, 6-7; EX1003, ¶53. By 2019, numerous patents and publications described renewable polyurethanes made from plant oil-based polyols, sugar-based polyols, and amino acid-based diisocyanates. EX1015, 6-7; EX1003, ¶53. Patents also disclosed a shift from silicone-based materials toward bio-based polyurethanes derived from renewable sources such as linoleic acid, demonstrating superior performance even without silicones. EX1018, 2:23-4:46, 5:36-6:5, 35:24-32; EX1019, 2:6-11; EX1008, ¶¶[0009]-[0011]; EX1003, ¶54.

This reflects a broader trend in the art, where companies and inventors recognized the advantages of bio-based polyurethanes and actively developed silicone-free formulations to meet both performance and sustainability goals. EX1003, ¶¶52-54.

D. Polyurethane elastomers were a well-known silicone-free elastomer class that had been used in a variety of fields.

Polyurethane elastomers are a well-established class of materials prized for their tunable mechanical properties, flexibility, and chemical resistance in diverse applications. EX1015, 2; EX1032, 114453; EX1004, ¶45. Elastomers can absorb fluids such as oil or water and swell, increasing in volume and softness, which can affect physical properties but also enable advantageous applications such as gel formation and delivery of therapeutic agents to the skin. EX1040, 487; EX1041, 141; EX1042, 7:16-17; EX1043, ¶[0004]; EX1013, 217; EX1004, ¶45. Long before 2019, polyurethane elastomers were already in use as flexible base films for percutaneous and transdermal drug delivery systems, where they provided a combination of softness, durability, and skin compatibility that was difficult to achieve with other polymers. EX1044, Abstract, ¶¶[0002]-[0010], Example 1; EX1004, ¶46. For example, European Patent Publication Nos. 2 853 573 (“Schüwer-573”) and 2 957 611 (“Schüwer-611”; (EX1020)), published in 2015, each disclose cross-linked polyurethane and dimer acid diol polyester/polyurethane elastomer compositions for use in skin-friendly adhesives, medical tapes, patches,

and non-medical applications such as masking tapes, protective tapes, and temporary bonding of semiconductor elements. EX1008, ¶¶[0011], [0106]-[0117]; EX1020, ¶¶[0166]-[0178]; EX1032, 114461; EX1045, 451, 459; EX1003, ¶55; EX1004, ¶47.

Both Schüwer-573 and Schüwer-611 emphasized that polyurethane elastomers can be synthesized from renewable, bio-based components and cross-linked to achieve desirable mechanical and adhesive properties, making them suitable for both biomedical and industrial uses. EX1008, ¶¶[0011], [0027], [0032]-[0042], [0070]-[0080], [0090], [0099]; [0121], [0126]-[0127]; EX1020, ¶¶[0023], [0036], [0044]-[0054], [0097]-[0100], [0115], [0166]; EX1003, ¶55; EX1004, ¶¶47-49.

Lastly, in 2017, U.S. Patent 9,815,939 B2 described bio-based, cross-linked polyurethane elastomers derived from dimer fatty acids and aliphatic diols, formulated as dispersions, coatings, adhesives, and elastomer compositions. EX1019, 1:15-20, 2:6-32, 5:26-32, 8:41-46; EX1004, ¶50; EX1003, ¶56. Accordingly, by 2019, polyurethane elastomers were a mature, well-known elastomer class, routinely used in medical, adhesive, and industrial applications due to their flexibility, chemical resistance, and ability to be tailored for specific end uses. EX1004, ¶51; EX1003, ¶57.

IV. SUMMARY OF THE '057 PATENT'S PROSECUTION HISTORY

The '057 patent issued on June 24, 2025, from U.S. Patent Application No. 18/066,105 (“the '105 Application”) filed on December 14, 2022, which claims priority to U.S. Patent Application No. 16/992,831 (“the '831 application”; EX1052), filed on August 13, 2020. The '831 application issued as U.S. Patent No. 11,534,389, which claims a non-aqueous gel composition comprising a cross-linked polyurethane elastomer rubber composition. EX1065, 26:18-54. The '831 application claims priority to two provisional applications: (1) U.S. Provisional Application No. 62/976,015 (“the '015 Provisional”; EX1053) filed on February 13, 2020; and (2) U.S. Provisional Application No. 62/893,968 (“the '968 Provisional”; EX1054) filed on August 30, 2019.

Original claim 1 of the '105 Application recited: “A method of preparing a non-aqueous gel composition, comprising: a) micronizing a cross-linked polyurethane elastomer rubber composition...” EX1002, 36. On December 19, 2024, the Examiner required the applicant to elect a single disclosed species for the then-claimed “cross-linked polyurethane elastomer rubber.” EX1002, 475. In response, Grant elected the following species: 1,5-pentamethylene diisocyanate trimer as polyisocyanate; and dilinoleic acid/propanediol copolymer (“DAPD”) as prepolymer. EX1002, 932. In that same response, on February 19, 2025, Grant also added new claims 28 and 31, which recited for the first time a “multi-functional

crosslinker” and “esterified dilinoleic acid.” EX1002, 927. Those claims are in the Group elected for prosecution in response to a second Restriction Requirement. EX1002, 936, 943.

On April 10, 2025, the Examiner issued a Non-Final Office Action rejecting pending claims 28-29, 34-35, and 46 as anticipated by US 3,192,185 B2. EX1002, 1022. In response, on April 18, 2025, Grant amended independent claim 28 to recite “wherein the polyester is an esterified dilinoleic acid or a branched C₃₆ dicarboxylic acid/diol copolymer.” EX1002, 1032, 1036-37.

The Examiner subsequently allowed the claims on May 14, 2025, because “[t]he specific species elected (the polyurethane prepared from DAPD polyol and PDT) is not suggested by the prior art. Also, cross-linked elastomers prepared from multi-functional crosslinkers and esterified dilinoleic acid are free of the prior art.” EX1002, 1097-98. The Examiner was wrong because, as explained herein and in the accompanying Sumerlin Declaration, both the elected species and cross-linked elastomers prepared from a “multi-functional crosslinker” and an “esterified dilinoleic acid” were both repeatedly disclosed in the art well before 2019. EX1004, ¶¶52-58. Furthermore, both the “multi-functional crosslinker” and “esterified dilinoleic acid” terms introduced on February 19, 2025, lack written description support in the priority documents, making another three years’ worth of prior art available against the allowed claims, but not considered during

prosecution.

V. PERSON OF ORDINARY SKILL IN ART

A person of ordinary skill in the art (POSA) for the '057 patent is a hypothetical individual presumed to be aware of all pertinent prior art and to possess ordinary creativity and conventional wisdom in the field. *KSR Int'l. Co. v. Teleflex Inc.*, 550 US 398, 421 (2007). A POSA in the field of the '057 patent would have knowledge of the scientific literature and possess skills in applying organic chemistry to the design and study of polymers with precise structures and properties prior to August 2019.

Such a POSA would be familiar with the scientific literature and skilled in laboratory techniques relevant to the synthesis and characterization of elastomers and related polymers. Typically, a POSA would have 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 one or more of these areas. EX1003, ¶¶24-25; EX1004, ¶¶22-23. A POSA may also have worked as part of a multidisciplinary team, drawing upon specialized skills of others, such as formulation scientists, to solve technical problems in the field. *Id.* Such a formulation scientist would have familiarity with developing cosmetic and personal care compositions and gel compositions. *Id.*

VI. CLAIM CONSTRUCTION

Claims must be given their ordinary and customary meaning in light of the specification—“the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (*en banc*); *see also* 37 C.F.R. §42.100(b); 83 Fed. Reg. 51,340, 51,358 (Oct. 11, 2018). As discussed below, the terms “multi-functional crosslinker” and “esterified dilinoleic acid” are extraordinarily broad in scope relative to the more limited disclosures provided in the specifications of the asserted priority applications. All other claim terms are plain on their face and require no further construction for the purposes of this Petition. Momentive reserves the right to rebut any claim construction arguments Grant might raise.

VII. OVERVIEW OF THE PRIOR ART

A. The '924 Publication (EX1007)

The '924 Publication, the publication of the '831 parent application, published on March 4, 2021. EX1007, 1. Because claims 1-17 are not entitled to a filing date earlier than December 14, 2022, the '924 Publication is prior art under 35 U.S.C. § 102(a)(1).

The '924 Publication discloses a reaction product of a polyester—specifically, an esterified dilinoleic acid/propanediol copolymer (DAPD), which is both an “esterified dilinoleic acid” and a “branched C₃₆ dicarboxylic acid/diol copolymer”—and a multi-functional polyisocyanate crosslinker (pentylene

diisocyanate trimer, PDT). EX1007, ¶¶[0299]-[0303]; EX1004, ¶53. This reaction yields a silicone-free, bio-based elastomer, which can be made into a gel. EX1007, ¶[0299]; EX1004, ¶¶53-55. The polyester is present at 78% by weight of the elastomer-forming reactants, and the preferred diol is propanediol. EX1007, ¶¶[0298]-[0299]; EX1004, ¶53.

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]; EX1004, ¶54; EX1003, ¶¶58-60. The elastomer is incorporated into foundations, lotions, creams, shampoos, serums, and lip care formulations. EX1007, ¶¶[0254], [0311]-[0316]; EX1004, ¶54; EX1003, ¶¶58-60. In gel compositions disclosed in the '924 Publication, the polyurethane elastomers are refined by milling to produce micronized elastomer particles stated to be in the 1–100 micron range, preferably less than 60 microns, and the gel has a stated viscosity ranging from 15,000 to 1,000,000 cP. EX1007, ¶¶[0017], [0035], [0295]; EX1004, ¶55; EX1003, ¶¶58-60.

B. Schüwer-573 (EX1008)

Schüwer-573, entitled, “Skin friendly adhesive” is prior art under 35 U.S.C. § 102(a)(1) because it published on April 1, 2015. EX1008, 1. Schüwer-573

expressly discloses cross-linked elastomer compositions formed by reacting a polyester (polycondensate) derived from a dimer of fatty acid (such as dilinoleic acid, including PRIPOL 1009 or PRIPOL 1006) and a diol (such as 1,4-butanediol) with a multi-functional polyisocyanate crosslinker (e.g., DESMODUR N3600). EX1008, ¶¶[0032]-[0037], [0042], [0052], [0122], [0125]-[0126]; EX1004, ¶57.

Schüwer-573 provides concrete examples using 1,4-butanediol as the diol. In Preparative Example 5, the polyester is present at approximately 96% by weight of elastomer-forming reactants. EX1008, ¶¶[0125]-[0126]; EX1004, ¶57. The publication repeatedly emphasizes that the disclosed formulations are silicone-free, developed as alternatives to silicone adhesives. EX1008, ¶¶[0009], [0122]-[0127]; EX1004, ¶58. 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 for transdermal delivery of a broad array of active pharmaceutical ingredients. EX1008, ¶¶[0106]-[0117]; EX1003, ¶¶61-63.

C. Patil (EX1009)

Patil's Chapter 2 entitled "Cosmetic Science and Polymer Chemistry: Perfect Together" is prior art under 35 U.S.C. § 102(a)(1) because it published in 2013. Patil provides a detailed examination of polymer usage in cosmetic and personal care compositions, emphasizing the rise of bio-based and silicone-free

alternatives. EX1009, 16-18, 20; EX1003, ¶64. Patil notes industry trends toward natural and sustainable bio-based formulations, specifically highlighting polyurethanes as versatile film formers and structural components in foundations, mascaras, eye shadow, skin care products, and lipsticks. EX1009, 20-21, 26-27; EX1003, ¶64. Patil outlines how polyurethane crosspolymers offer strong film formation and can be used to increase product viscosity. EX1009, 26; EX1003, ¶64.

D. Vervier (EX1010)

Vervier, entitled “Masking Wrinkles and Enhancing Skin Feel with Silicone Elastomer Powder” is prior art under 35 U.S.C. § 102(a)(1) because it published in 2006. Vervier describes the development and use of silicone elastomer powders in skin care and cosmetic formulations. EX1010, 65-70; EX1003, ¶65. These powders, composed of spherical dimethicone/vinyl dimethicone crosspolymer particles 1-10 microns in size, are engineered to provide wrinkle-masking, sebum control, and unique sensory effects. EX1010, 66-70; EX1003, ¶65. The spherical shape imparts a ball-bearing effect, resulting in a dry, silky, and lubricating feel on the skin. EX1010, 65; EX1003, ¶¶66-67. The following silicone elastomer formulas can be used in a variety of applications:

- **Formula 1:** a water/silicone (W/S) skin cream containing 4% elastomer powder in a carrier fluid, which demonstrated immediate wrinkle-masking

effects *in vivo*. EX1010, 66-67; EX1003, ¶66.

- **Formula 2:** a 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; EX1003, ¶66.
- **Formula 3:** 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; EX1003, ¶66.

VIII. IDENTIFICATION OF THE CHALLENGE (37 C.F.R. §42.104(B))

Momentive Performance Materials Inc. requests IPR based on the following grounds:

Ground	35 U.S.C. Section	Claims	References
1	§ 102(a)(1)	1-17	'924 Publication
2	§ 102(a)(1)	1-7	Schüwer-573
3	§ 103	8-17	Schüwer-573, Patil, and Vervier

IX. DETAILED EXPLANATION OF GROUNDS

A. Ground 1: The '924 Publication anticipates claims 1-17

Because the priority applications disclose only a narrow subset of species that do not demonstrate possession of the broadly claimed “esterified dilinoleic

acid” and “multi-functional crosslinker” genera in the challenged claims, claims 1-17 are not entitled to a priority date earlier than the ’105 application’s December 14, 2022 filing date.

1. None of claims 1-17 is entitled to claim priority earlier than December 14, 2022.

Claims 1-17 of the ’057 patent are not entitled to a filing date earlier than December 14, 2022—the ’105 application’s filing date—because none of the ’831 application, the ’015 Provisional, nor the ’968 Provisional, satisfy the written description requirements of 35 U.S.C. § 112 for the full scope of the ’057 patent claims. *In re NTP, Inc.*, 654 F.3d 1268, 1277 (Fed. Cir. 2011).

To claim priority from an earlier application under 35 U.S.C. §§ 119 or 120, each application to which priority is claimed must comply with 35 U.S.C. § 112’s written description requirement. *Zenon Env’t, Inc. v. U.S. Filter Corp.*, 506 F.3d 1370, 1378 (Fed. Cir. 2007). In other words, “claims added during prosecution must find support sufficient to satisfy § 112 in the written description of the original priority application[s].” *Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1344 (Fed. Cir. 2013).

With respect to genus claims, merely drawing a fence around a perceived genus is not a description of the genus. One needs to show that one has truly invented the genus, *i.e.*, that one has conceived and described sufficient representative species encompassing the breadth of

the genus. Otherwise, one has only a research plan, leaving it to others to explore the unknown contours of the claimed genus.

AbbVie Deutschland GmbH v. Janssen Biotech., Inc., 759 F.3d 1285, 1300 (Fed. Cir. 2014). Instead, the description must: (1) disclose a representative number of species falling within the scope of the genus or (2) include preferences that narrow the genus to a sufficiently small disclosure so that a POSA can easily “visualize or recognize” the members of the genus. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1349-50 (Fed. Cir. 2010) (*en banc*). (“[A]n adequate written description of a claimed genus requires more than a generic statement of an invention’s boundaries.”) And where the disclosed species “only abide in a corner of the genus,” the inventor has not described the genus sufficiently to show possession. *AbbVie Deutschland*, 759 F.3d 1299-1300.

a. “[E]sterified dilinoleic acid” and “multi-functional crosslinker” in claim 1 are massive genera that are not adequately described in any priority document

Claim 1 is directed to a cross-linked elastomer that is a reaction product of two massive genera: (i) “esterified dilinoleic acid” and (ii) “multi-functional crosslinker.” It is settled law that a genus can be sufficiently disclosed by “either a representative number of species falling within the scope of the genus or structural features common to the members of the genus so that one of skill in the art can ‘visualize or recognize’ the members of the genus.” *Ariad*, 598 F.3d at 1350. The

priority documents provide neither. EX1004, ¶¶71-74. None of the '015 Provisional, the '968 Provisional, nor the '831 application demonstrate a representative number of species nor structural features common to the members of the genus to demonstrate that the inventors possessed the breadth of “esterified dilinoleic acid” or “multi-functional crosslinker” when filing the priority documents. EX1004, ¶¶71-74.

i. “Esterified dilinoleic acid” is an expansive and vast genus

Claim 1 recites that “the polyester is an *esterified dilinoleic acid*,” but that term appears nowhere in the priority specifications and was first introduced in new claim 31, in the February 19, 2025 Response to Restriction Requirement filed in the '105 application. EX1002, 927.

The term “esterified dilinoleic acid” sweeps extraordinarily broadly, as the claim language fails to impose any meaningful chemical constraints. It does not specify the (1) type of alcohol used to esterify the dilinoleic acid; (2) functional group incorporated during esterification; (3) degree of esterification and the resulting molecular weight; or (4) branching architecture. EX1004, ¶¶75-77. Each of these unconstrained variables independently produces chemically distinct esterified dilinoleic acid species, and in combination they give rise to an immense and effectively unbounded number of possible structures within the scope of the claim. EX1004, ¶77.

First, the term “esterified dilinoleic acid” does not specify how the dilinoleic acid is esterified and can therefore encompass products formed by reacting dilinoleic acid with a wide range of alcohols. EX1015, 252; EX1004, ¶78. For example, as shown below, reaction with a diol (e.g., propanediol) in Figure A can yield a product with terminal hydroxyl groups that react with multi-functional crosslinkers (e.g., polyisocyanates) to form *linear* polyurethanes (Figure B), while reaction with a triol (e.g., glycerol) in Figure C introduces multiple hydroxyl groups that increase crosslinking density when reacted with a multi-functional crosslinker (Figure D). EX1032, 114455-56, 114462; EX1015, 2; EX1031, ¶¶[0065], [0113]; EX1004, ¶¶43, 78-80. Because the alcohol type affects reactivity, “esterified dilinoleic acid” in claim 1 encompasses a broad range of structurally distinct polyesters. EX1046, 781; EX1032, 114456, 114462. EX1004, ¶¶80-81.

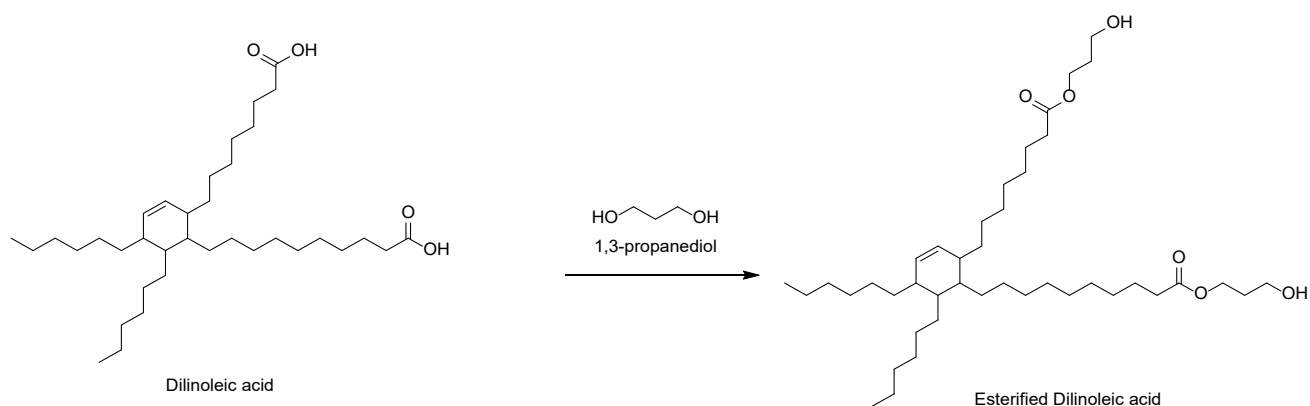


Figure A: Dilinoleic Acid + 1,3-propanediol

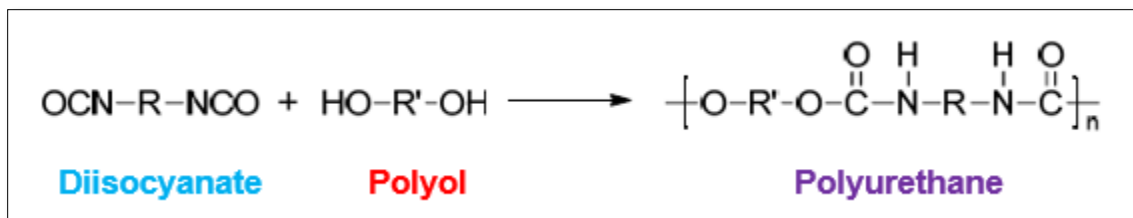


Figure B: Linear Polyurethane

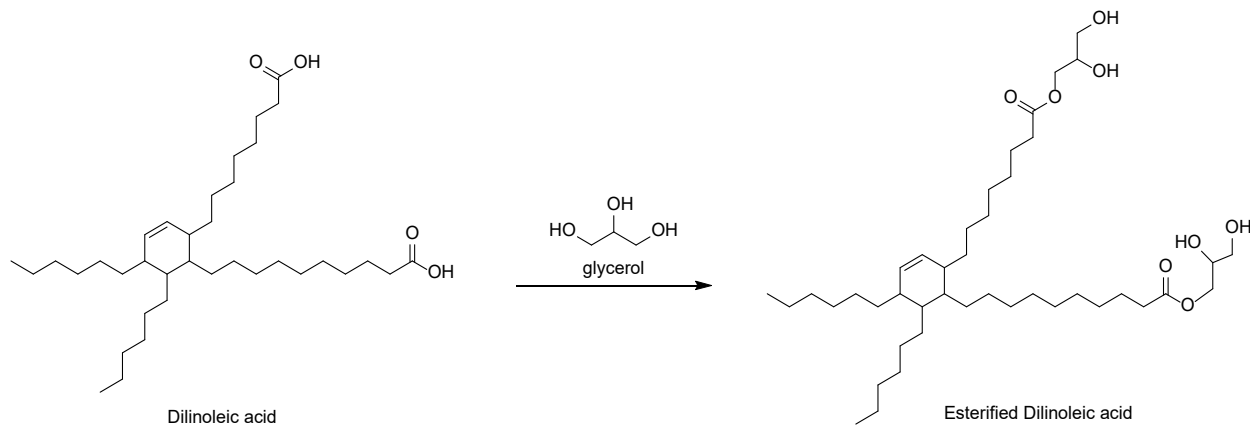


Figure C: Dilinoleic Acid + Glycerol

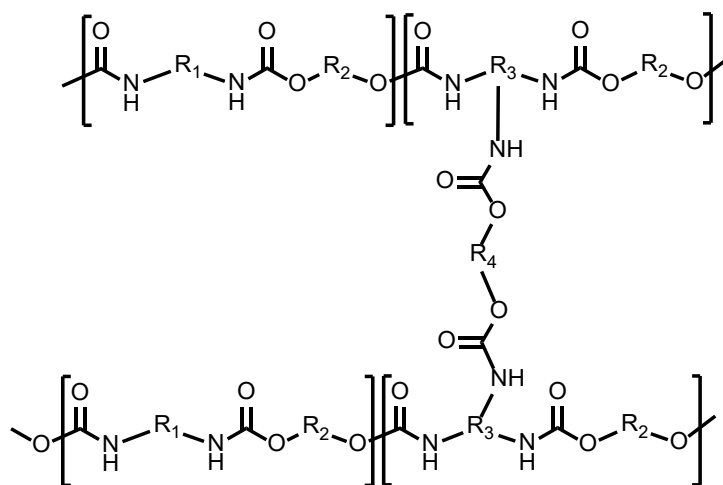


Figure D: Cross-linked Polyurethane

Second, the term “esterified dilinoleic acid” does not specify the identity of the functional groups present that may react with a multi-functional crosslinker, as

the alcohol used to esterify may introduce additional functional groups beyond hydroxyl. EX1004, ¶¶82-85. For example, the esterified product may include amine, amide, epoxide, acid, anhydride, or thiol groups depending on the starting alcohol, resulting in hydroxyl-terminated or mixed-functional species capable of reacting with a wide range of crosslinkers and increasing crosslinking pathways. EX1047, 3-5; EX1046, 706-07, 791; EX1033, 78. EX1004, ¶¶83-84. Thus, “esterified dilinoleic acid” encompasses a broad range of chemically distinct species with varying type and number of functional groups, which materially affect their reactivity and performance. EX1004, ¶85.

Third, the degree of esterification of dilinoleic acid—ranging from partially esterified to substantially or fully esterified—introduces significant variability based on stoichiometry and reaction completion, which determines the amount of unreacted functional groups. EX1048, 3940; EX1004, ¶86. These differences are material, as ester groups reduce polarity and eliminate hydrogen bonding compared to carboxylic acids, altering physical properties. EX1046, 827; EX1004, ¶87. The degree of esterification also directly impacts molecular weight, spanning from low-molecular-weight cyclic oligomers to higher-molecular-weight linear polyesters. EX1049, 197-98; EX1004, ¶88. Molecular weight variation materially affects polyurethane properties: higher values yield softer segments, while lower values produce more rigid materials with increased strength, modulus, and thermal

stability, often requiring additional isocyanate. EX1045, 448; EX1032, 114461; EX1033, 70; EX1004, ¶89. Accordingly, “esterified dilinoleic acid” encompasses a wide range of chemically distinct species with varying molecular weights, degrees of esterification, and resulting properties. EX1004, ¶¶90-91.

Fourth, branching architecture broadens the genus even further because esterification products can be lightly branched or highly branched. EX1037, 2293; EX1004, ¶92. The extent of branching of the esterified dilinoleic acid depends on a number of factors, including the functionality of the alcohol component and the monomer units. EX1050, Figure 1; EX1004, ¶92. Indeed, the presence of a tricarboxylic acid impurity in the dilinoleic acid starting material can also promote additional branching, whereas in its absence, the resulting “esterified dilinoleic acid” polyester may be predominantly linear (notwithstanding the alkyl branching inherent to the dimer acid). EX1070, ¶¶[0027]-[0029]; EX1004, ¶92. The transition from less branched to more branched architectures materially alters topology, and key properties such as viscosity, crystallization, and melting behavior. EX1038, Table 2; EX1051, 1277-78, 1285; EX1004, ¶93. Thus, because claim 1 does not limit the branching architecture, it sweeps in a wide array of “esterified dilinoleic acid” architectures that a POSA would recognize as numerous chemically distinct species within the genus. EX1004, ¶¶94-95.

These four variables operate independently and multiplicatively resulting in

a massive genus. EX1004, ¶96.

ii. None of the priority documents describes the full scope of “esterified dilinoleic acid”

A POSA reviewing the priority applications would understand that the disclosures are limited to two specific species of “esterified dilinoleic acid” and therefore do not demonstrate possession of the full scope of the broadly claimed genus. Against this massive genus of “esterified dilinoleic acid” encompassed in claim 1, the ’015 Provisional discloses only two specific, closely related diol-based species: dilinoleic acid/propanediol copolymer (“DAPD”) and dilinoleic acid/butanediol copolymer (“DABD”). EX1053, 9, 19; EX1004, ¶¶103-106. The ’968 Provisional discloses only DAPD. EX1054, 8-9; EX1004, ¶¶107-110. The ’831 application repeats the same disclosure: listing only “dilinoleic acid/propanediol copolymer” as the “preferred prepolymer,” with butanediol as an alternative species. EX1052, 10-11, 21; EX1004, ¶¶97-102.

Although the priority applications include lists of example polyols, merely identifying potential polyol starting materials, without disclosing resulting esterified dilinoleic acid polyesters spanning the genus’ structural variability, is insufficient to support the claimed scope². EX1004, ¶111. Nor do the priority

² Nothing incorporated by reference in the priority applications (including EX1055) provides support for the broad scope of “esterified dilinoleic acid.”

applications disclose structural features common to the full genus sufficient for a POSA to visualize or recognize additional genus members beyond those two species. *Ariad*, 598 F.3d at 1350-51. As in *Samsung*, a small number of closely related species does not demonstrate possession of a broad genus. *Samsung Elecs. Co. v. Acorn Semi, LLC*, IPR2020-01206, Paper 49 at 18, 24 (P.T.A.B. Jan. 12, 2022).

iii. “Multi-functional crosslinker” is a broad, unbounded genus

Claim 1 recites a cross-linked elastomer comprising “a reaction product of a polyester and a *multi-functional crosslinker*.” EX1001, claim 1. The term “multi-functional crosslinker” appears nowhere in any of the priority specifications. EX1004, ¶¶117-118. The first recitation of “multi-functional crosslinker” appears in new claim 28, introduced in a Response to Restriction Requirement filed on February 19, 2025. EX1002, 927.

Crosslinking encompasses chemically joining polymer chains to increase network connectivity and form three-dimensional structures that enhance material properties³. EX1039, 218; EX1032, 114462; EX1004, ¶119. Because any multi-

EX1004, ¶¶112-116.

³ Crosslinking occurs when either the crosslinker or the polymer has more than two reactive functional groups, provided the other has at least two. EX1064,

functional crosslinker capable of reacting with available functional groups in a formed polyester can participate, the term is extraordinarily broad, encompassing an immense genus of chemically distinct crosslinkers that are capable of reacting with a fully formed polyester—i.e., a polyester (either an “esterified dilinoleic acid” or a “branched C₃₆ dicarboxylic acid/diol copolymer”)—through a variety of functional groups and mechanisms. EX1004, ¶¶120-125.

For example, multi-functional crosslinkers can be:

1. epoxy-based (EX1056, 37),
2. phenol-based (EX1057, 1),
3. urea-based (EX1058, 233),
4. melamine-based (EX1059, Abstract),
5. aziridines (EX1061, 704-705),
6. polyisocyanates (EX1032, 114454),
7. multifunctional amines (EX1062, 37267), and
8. multifunctional acids (EX1062, 37267).

EX1004, ¶120.

And within these classes of multi-functional crosslinkers lie numerous distinct crosslinking species, for example:

103-105; EX1033, 78; EX1004, ¶119.

- **epoxy-based crosslinkers** include: diglycidyl ether of triethylene glycol (DGETEG), poly(propylene glycol) diglycidyl ether (PPGDGE), and diglycidyl ether of diethylene glycol (DGEG); phenol-formaldehyde resins such as hydroxymethyl phenol; urea-formaldehyde resins; melamine-formaldehyde resins; and
- **aziridine crosslinkers** include: trimethylolpropane tris-(1-(2-methyl)aziridino)propionate (TTMAP), trimethylolpropane tris-3-(1-aziridinopropionate) (TTAP), and pentaerythritol tris-3-(1-aziridinopropionate) (PTAP).

EX1056, 37; EX1057, 1; EX1058, 233; EX1059, 2631; EX1060, Abstract; EX1032, 114464, 114470; EX1004, ¶121. These classes of multi-functional crosslinkers comprise structurally diverse compounds with different crosslinking chemistries and reactivities. *Id.*

Notably, Grant asserts that a “multi-functional crosslinker” is broad enough to encompass a “glycerol moiety,” even though no glycerol moiety is disclosed in the priority applications or the ’057 patent specification as an example of a multi-functional crosslinker. EX1063, 1.

Furthermore, it was known that the mechanical properties of cured elastomeric particles are determined by cross-link density, which can, in part, be influenced by choice of crosslinker. EX1033, 79; EX1034, 2; EX1013, 209;

EX1032, 11458; EX1004, ¶¶122-123. In other words, a chemist may select different crosslinkers to achieve different material properties, confirming that there is no single or narrow class of suitable crosslinkers, but rather a wide range of chemically distinct crosslinkers available depending on the desired performance characteristics. EX1013, 209; EX1015, 31; EX1033, 78; EX1034, 2; EX1004, ¶124.

Importantly, the breadth of the term “multi-functional crosslinker” cannot be considered in isolation. EX1004, ¶126. The claim requires the crosslinker to interact with an “esterified dilinoleic acid,” but that requirement does not narrow the scope; instead, because the “esterified dilinoleic acid” recited in the claims is itself a chemically broad and unconstrained genus, the nature of the interaction and thus the permissible crosslinkers necessarily depend on the particular polyester structure selected. EX1004, ¶¶126-127. As a result, the claim encompasses esterified dilinoleic acid species bearing a wide variety of functional groups, each implicating a different universe of chemically compatible crosslinkers and reaction mechanisms. EX1004, ¶128. Thus, the undefined chemical variability of “esterified dilinoleic acid” further enlarges and multiplies the already expansive genus of “multi-functional crosslinkers.” EX1004, ¶129.

iv. None of the priority documents describes the full scope of “multi-functional crosslinker”

A POSA reviewing the priority applications would understand that the

disclosures are limited to polyurethane crosslinkers, polyisocyanates specifically, and therefore do not demonstrate possession of the full scope of the broadly claimed genus of “multi-functional crosslinkers.” The ’057 patent specification’s only reference to a crosslinker is as follows: “a multifunctional, e.g. a tri-functional, *polyurethane* crosslinker.” EX1001, 3:29-35 (emphasis added); EX1004, ¶117. And the only compound class disclosed, and used as a crosslinker in the examples, are polyisocyanates, which a POSA would understand to be polyurethane crosslinkers used in urethane-forming reactions. EX1004, ¶38-43, 117. But claim 1 recites a generic “multi-functional crosslinker” without restricting the claim to polyurethane crosslinkers. The priority applications fail to disclose this broad genus. EX1004, ¶¶130-147. The ’015 Provisional and the ’968 Provisional disclose crosslinking exclusively in the polyurethane context—reacting polyols/polyester prepolymers with polyisocyanates in the presence of urethanation catalysts to form “cross-linked polyurethane” elastomer rubbers. EX1053, 3:30-31, 4:20-24, 5:26-28, 7:18-19, 12-13, 16:10-31:5; EX1054, 3:29-30, 4:20-24, 5:24-26, 7:16-17, 12-13, 14:28-25:5; EX1004, ¶¶137-147.

The ’831 application also discloses crosslinking exclusively in the polyurethane context. For example, its Summary of the Invention states the elastomer is a polyester linked between a multifunctional “polyurethane crosslinker” and then describes forming a cross-linked polyurethane rubber by

reacting a polyisocyanate with a prepolymer in the presence of a urethanation catalyst and cosmetic emollient. EX1052, 4:3-5; EX1004, ¶132. The '831 application continues this polyurethane-only disclosure throughout its specification. EX1052, 6:1-3; 8:12-13; 13:8-14; 18:8-11; 18:11-22:3; 23:6-34:25; EX1004, ¶130-136. This narrow focus is reinforced by the lists of functionalized isocyanates/polyisocyanates and urethanation catalysts in the priority applications. EX1053, 7:18-19, 12-13; EX1054, 12-13; EX1052, 13:8-14; EX1004, ¶¶133, 139, 144.⁴ Critically, at no point does any priority application disclose a non-polyurethane crosslinking mechanism or any non-isocyanate crosslinker classes encompassed by claim 1's broad language⁵. EX1004, ¶¶131-147.

Under *Ariad*, a priority disclosure must do real work: it must either disclose a representative number of species spanning the genus or articulate common structural features that let a POSA "visualize or recognize" the genus members.

⁴ Notably, U.S. Patent No. 11,534,389, which issued from the '831 application, limits its claims to "a cross-linked *polyurethane* elastomer rubber." EX1065, 26:8-21 (emphasis added); EX1004, ¶131.

⁵ Nothing incorporated by reference (including EX1055) in the priority applications provides support for non-polyurethane "multi-functional crosslinkers." EX1004, ¶¶148-152.

Ariad, 598 F.3d at 1350-51. The priority applications do neither. They do not disclose multiple, diverse crosslinker species across the claimed “multi-functional crosslinker” genus, nor do they provide any shared structural features, principles of selection, or other roadmap that would guide a POSA to the many classes of non-polyurethane crosslinkers swept into claim 1 by its unqualified genus language. Instead, each disclosure is confined to a single, narrow corner of the genus of “multi-functional crosslinkers”—polyurethane/polyisocyanate crosslinkers—leaving the remainder of the genus wholly undescribed. *AbbVie*, 759 F.3d at 1299-1300; *Samsung Elecs.*, IPR2020-01206, Paper 49 at 18, 24. Accordingly, the priority documents disclose, at most, a single class of crosslinkers”—polyurethane/polyisocyanate crosslinkers—representing a narrow subset of a far larger, generically recited genus (first introduced long after filing), and therefore do not provide written-description support for the full scope of the claimed “multi-functional crosslinker.”

The same result follows under *Gentry Gallery* and *ICU Medical*. In *Gentry Gallery*, the Federal Circuit held that a patentee cannot expand the claims beyond what the specification identifies as the invention—particularly where the disclosure consistently ties the invention to a particular structure—and then rely on generic claim language to capture undisclosed variants. *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479-80 (Fed. Cir. 1998). Likewise, *ICU Medical* held that

a patentee may not disclose an invention that relies on a particular feature—a “spike” needle—and later broaden the claims to cover a broader genus that includes a “spikeless” needle, absent a disclosure showing possession of the broader scope. *ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1376-78 (Fed. Cir. 2009). Both cases compel a finding of lack of priority.

Here, the priority documents repeatedly and exclusively describe an elastomer formed using a multi-functional *polyurethane* crosslinker, and they provide no disclosure suggesting that “multi-functional crosslinkers” broadly were part of the invention. Having disclosed only a polyurethane embodiment, Grant cannot later claim the entire field of “multi-functional crosslinkers” while omitting any corresponding description of non-polyurethane crosslinkers. Under *Gentry Gallery* and *ICU Medical*, claim 1’s later expansion to any “multi-functional crosslinker” exceeds the polyurethane/polyisocyanate crosslinkers description in the priority documents, which therefore cannot support the asserted priority date.

* * *

Because the priority applications do not provide written description support for claim 1’s broad genus limitations—(i) “multi-functional crosslinker,” and (ii) “esterified dilinoleic acid”—claim 1 is not entitled to a priority date earlier than the ’105 application’s December 14, 2022, filing date. *In re NTP*, 654 F.3d at 1277; *Ariad*, 598 F.3d at 1351; *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d

1299,1310 (Fed. Cir. 2008); EX1004, ¶153.

b. None of dependent claims 2-17 sufficiently narrow the “multi-functional crosslinker” and “esterified dilinoleic acid” genera to align with the species disclosed in the priority documents

Claim 2 is also not entitled to an earlier priority date because, despite narrowing the “multi-functional crosslinker” to a polyisocyanate, it does not limit the separately recited “esterified dilinoleic acid” genus. EX1004, ¶¶154-155. Claim 2 therefore still covers a broad range of esterified dilinoleic acids, and the priority applications do not provide written description support for that genus as claimed. EX1004, ¶155.

Claims 3-17 likewise lack entitlement to the 2019 priority date because none of them meaningfully limits either of the “multi-functional crosslinker” or “esterified dilinoleic acid” terms. EX1004, ¶¶156-158. Claims 3-17 depend ultimately from claim 1 and expressly require the same composition defined by those two terms. EX1004, ¶¶156-158. Although claim 7 narrows the “branched C₃₆ dicarboxylic acid/diol copolymer” to dilinoleic acid/propanediol and dilinoleic acid/butanediol copolymers—which may fall within the broader category of “esterified dilinoleic acid”—these two closely related species do not demonstrate possession of the vast chemical genus encompassed by that term. EX1004, ¶157. And even if the Board were to conclude otherwise, claim 7 does nothing to limit the separately recited and unsupported “multi-functional crosslinker” genus of

claim 1. *Id.* As a result, the same written description deficiencies apply across all dependent claims.

Accordingly, because none of the claims eliminates or narrows the unsupported scope of the “multi-functional crosslinker” and “esterified dilinoleic acid” terms, no claim of the ’057 patent is entitled to an earlier priority date than December 14, 2022. *Gilead Sciences, Inc. v. Regents of the University of Minnesota*, IPR2017-01712, Paper 67 (P.T.A.B. May 21, 2021); *Daiichi Sankyo, Inc. v. Seagen Inc.*, PGR2021-00030, Paper 57 (P.T.A.B. Jan. 16, 2024).

2. The ’924 Publication anticipates claims 1-17.

Because claims 1-17 are not entitled to filing date before December 14, 2022, the ’924 Publication (the published application of the ’831 parent application) qualifies as prior art under 35 U.S.C. § 102(a)(1) and anticipates each of claims 1-17.

A claim is anticipated only if each and every element is found, either expressly or inherently, in a single prior-art reference. *Cont’l Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). Where a claim recites a genus, disclosure of a single species within that genus is sufficient for anticipation. *Eli Lilly & Co. v. Barr Lab’ys, Inc.*, 251 F.3d 955, 971 (Fed. Cir. 2001). And, while the disclosure of a single species in a priority application may be insufficient to demonstrate possession of a genus, the same disclosure in a prior art reference

may be enough to invalidate a claim to that genus. *Samsung Elecs. Co.*, IPR2020-01206, Paper 49 at 14, 24, 39. As explained below, the '924 Publication discloses each and every element of claims 1–17 of the '057 patent, arranged as claimed, and in a manner enabling to a POSA, therefore anticipating claims 1-17.

- a. **Claim 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 C₃₆ dicarboxylic acid/diol copolymer”**

The '924 Publication expressly discloses a cross-linked elastomer formed by reacting a polyester with a multi-functional polyurethane crosslinker. EX1007, ¶¶[0016], [0020]-[0021], [0083]-[0087], [0176]-[0221]; EX1066, Table 1, 20; EX1035, 2; EX1004, ¶¶159-168. The '924 Publication, in Example 1, expressly discloses forming a cross-linked elastomer by reacting a dilinoleic acid/propanediol copolymer (“DAPD”)—a polyester and “branched C₃₆ dicarboxylic acid/diol copolymer”—with pentylene diisocyanate trimer (PDT), a multi-functional crosslinker. EX1007, ¶¶[0297]-[0299]; EX1004, ¶164. This reaction is carried out in the presence of a urethanation catalyst to yield a cross-linked polyurethane elastomer gel. EX1007, ¶[0299]; EX1004, ¶164. The use of DAPD as the polyester prepolymer and PDT as the multi-functional crosslinker falls squarely within the scope of claim 1, which requires a cross-linked elastomer formed from a “branched C₃₆ dicarboxylic acid/diol copolymer” and a “multi-functional crosslinker.” EX1007, ¶[0299]; EX1004, ¶¶163-164. Thus, Example 1

of the '924 Publication anticipates claim 1 by disclosing each of these elements explicitly. *Id.* Each of Examples 2-5 similarly discloses a cross-linked elastomer comprising a reaction product of DAPD and PDT. EX1007, ¶¶[0299]-[0303]; EX1004, ¶¶165-168.

b. Claim 2: “The cross-linked elastomer of claim 1, wherein the multi-functional crosslinker is polyisocyanate.”

The '924 Publication expressly discloses “reacting a polyisocyanate with a [polyester] prepolymer” to form a “cross-linked polyurethane elastomer.” EX1007, ¶¶[0016], [0299]; EX1004, ¶169. Examples 1-5 each specifically discloses the use of pentylene diisocyanate trimer (PDT), which functions as a polyisocyanate, multi-functional crosslinker in the elastomer synthesis. EX1007, ¶¶[0020], [0176], [0190], [0299]-[0303]; EX1004, ¶169.

c. Claim 3: “The cross-linked elastomer of claim 1, wherein the diol is propanediol or butanediol.”

The '924 Publication expressly identifies “dilinoic acid/*propanediol* copolymer” as a preferred polyester prepolymer. EX1007, ¶¶[0083], [0299]; EX1004, ¶170. And Examples 1-5 each specifically discloses the use of DAPD in the elastomer synthesis. EX1007, ¶¶[0299]-[0303]; EX1066, Table 1; EX1004, ¶170. Because propanediol is expressly disclosed, the '924 Publication anticipates claim 3. EX1004, ¶170.

- d. Claim 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.”**

The '924 Publication describes a cross-linked elastomer wherein the polyester is greater than 60% by weight of the total weight of the elastomer. EX1007, ¶[0298]; EX1004, ¶¶171-173. In Example 1, the '924 Publication discloses a formulation comprising 11.25 grams of the polyester/polyol component (“DAPD polyol”) and 3.15 grams of the polyisocyanate crosslinker (pentylene diisocyanate trimer (“PDT”)). EX1007, ¶[0299]; EX1004, ¶171. Because the “cross-linked elastomer” is formed from the polyester/polyol and the polyisocyanate crosslinker, while carrier/emollients aid processing, the polyester at 11.25 grams comprises approximately 78% of the elastomer-forming reactants ($11.25 \text{ g} \div (11.25 \text{ g} + 3.15 \text{ g}) = 78\%$), which is greater than 60% by weight, satisfying claim 4. EX1007, ¶¶[0034], [0093], [0298]–[0299]; EX1004, ¶¶171-173.

- e. Claim 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.”**

The '924 Publication likewise describes a cross-linked elastomer wherein the polyester is greater than 75% by weight of the total weight of the elastomer. As discussed above, the '924 Publication discloses in Example 1 a cross-linked elastomer where the polyester comprises approximately 78% of the elastomer-forming reactants, which is greater than 75% by weight, satisfying claim 5.

EX1007, ¶¶[0298]–[0299]; EX1004, ¶174.

f. Claim 6: “The cross-linked elastomer of claim 1, wherein the cross-linked elastomer is silicone-free.”

The '924 Publication repeatedly emphasizes that the disclosed elastomer is a silicone alternative, developed specifically to replace silicone elastomers. EX1007, ¶[0006]; EX1004, ¶175. Indeed, the '924 Publication discloses “a silicone alternative elastomeric gel of at least 85 or even >98% bio-based material.” EX1007, ¶[0018]; EX1004, ¶175. And none of Examples 1-5 include a silicone. EX1007, ¶¶[0299]–[0303], [0319]; EX1004, ¶¶176.

g. Claim 7: “The cross-linked elastomer of claim 1, wherein the branched C₃₆ dicarboxylic acid/diol copolymer is dilinoleic acid/propanediol copolymer or dilinoleic acid/butanediol copolymer.”

As discussed above, the '924 Publication discloses dilinoleic acid/propanediol copolymer as a preferred prepolymer and DAPD is the prepolymer used in each of Examples 1-5. EX1007, ¶¶[0046], [0058], [0083], [0299]–[0303]; EX1004, ¶177.

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

The '924 Publication describes synthesizing “an optimal polyurethane rubber” by optimizing the “ratio of polymer content to *carrier fluid*.” EX1007, ¶[0032] (emphasis added); EX1003, ¶¶72-78. Then, the '924 Publication describes converting that elastomeric rubber into a “cosmetically elegant and stable gel” by

milling the elastomer rubber in the presence of cosmetic emollients. EX1007, ¶¶[0031]-[0032]; EX1003, ¶75. Example 6 describes preparing an elastomer gel by combining the Example 1 rubber with glyceryl triheptanoate and diluting with C9–C12 alkanes—both of which are carrier fluids—to form a cosmetic gel composition. EX1007, ¶[0304]; EX1003, ¶76. Thus, the '924 Publication discloses a cosmetic composition comprising a cross-linked elastomer and a carrier fluid. EX1007, ¶¶[0031]-[0032], [0293]; EX1003, ¶77.

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

The '924 Publication provides water-in-oil or “W/O” emulsion Examples 16 and 17, where a water phase (Phase B) containing deionized water is combined with an oil phase (Phase A) comprising coco-caprylate/caprate (Cetiol LC) and the Gransense™ elastomer gel, thereby meeting the water-phase and oil-phase requirement of claim 9. EX1007, ¶¶[0311]-[0313]; EX1003, ¶¶78-81.

j. 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.”

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,” “sunscreens,” “plant extract,” and “fragrance.” EX1007, ¶¶[0031], [0035]; EX1003,

¶82. Example 15 is an “SPF-50 sunscreen” made with the elastomer from Example 6, and zinc oxide and titanium oxide, both of which are sunscreens. EX1007, ¶[0310]; EX1003, ¶¶83-84.

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

As discussed above, the ’924 Publication discloses incorporation of conventional cosmetic additives, including fragrances. EX1007, ¶¶[0035], [0254], Table 7; EX1003, ¶85. The ’924 Publication also discloses preservatives in Example 16, where Nipaguard SCM—identified as “Methylisothiazolinone & propylene glycol & sorbitan caprylate”—is used as an ingredient in the aqueous phase, which a POSA would recognize as a preservative system. EX1007, ¶[0312], Table 4; EX1011, 188S; EX1003, ¶85. Examples 17-18 disclose formulations containing colorants, including iron oxides (CI 77491/77492/77499), titanium dioxide, and D&C Red No. 7. EX1007, ¶¶[0313]-[0315]; EX1012, Table 1-A; 21 C.F.R. § 74.1307(a); EX1003, ¶¶86-87.

l. 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.”

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, ¶¶[0017], [0254]; EX1003, ¶88.

The '924 Publication further provides working examples 16-19 of these exact categories, including emulsion creams, a cream-to-powder foundation, lip products, and shampoos, demonstrating use in the claimed formulation types. EX1007, ¶¶[0311]-[0316]; EX1003, ¶88-89.

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

The '924 Publication expressly discloses a gel composition comprising a cross-linked polyurethane elastomer dispersed in a carrier fluid, explaining that the elastomer rubber is milled in the presence of cosmetic emollients to form a rubber dispersion (i.e., a gel). EX1007, ¶¶[0017], [0031]; EX1004, ¶178. The '924 Publication equates “carrier fluid” with “cosmetic emollient,” disclosing, for example, “polar carrier fluids like MCTs” (EX1007, ¶[0009]) and identifying MCTs as preferred emollients (EX1007, ¶[0293]); EX1004, ¶178. The '924 Publication further confirms that the carrier fluid functions to disperse the elastomer, emphasizing that the polymer-to-carrier-fluid ratio is critical because insufficient carrier fluid results in an elastomer that cannot be properly dispersed when milled. EX1007, ¶¶[0025], [0031]-[0032]; EX1004, ¶179. Consistent with this teaching, Examples 6 and 7 prepare elastomer gels by mixing the Example 1 rubber with emollients (carrier fluids), including glyceryl triheptanoate and C9–C12 alkanes. EX1007, ¶¶[0304], [0294]; EX1004, ¶¶180-181.

n. Claim 14: “The gel composition of claim 13, the cross-linked elastomer is in micronized form.”

The '924 Publication discloses that the gel composition is a rubber dispersion refined by milling steps that produce a targeted particle size range, and that gel compositions include the elastomer “preferably in micronized form.” EX1007, ¶¶[0017]; EX1004, ¶182. The '924 Publication's Examples 6-7 further describes milling that reduces particle size to below 100 microns and more preferably into the 1-60 micron range. EX1007, ¶¶[0304]-[0305]; EX1004, ¶¶183-184.

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

The '924 Publication expressly states that the gel composition is refined to a “final product in the 1 to 100 micron range,” with preferred smaller ranges. EX1007, ¶¶[0017], [0025], [0304]-[0305]; EX1004, ¶185.

p. Claim 16: “The gel composition of claim 15, wherein the particle size is less than 60 microns.”

The '924 Publication teaches that the gel compositions are preferably refined to “1 to 60 microns,” and further describes milling to reduce the particle size to “less than about 60 microns.” EX1007, ¶¶[0017], [0025], [0304]-[0305]; EX1004, ¶¶186-187.

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

The '924 Publication expressly discloses that the gel composition “can have a viscosity ranging from about 15,000 to about 1,000,000 cP.” EX1007, ¶[0035]; EX1004, ¶188. Examples 6 and 7 report elastomer gel viscosities of 102,440 cP and 416,667 cP, respectively. EX1007, ¶¶[0304]-[0305]; EX1004, ¶189.

3. The '924 Publication's disclosure is enabling.

An anticipatory publication must also be enabling but need only enable a single embodiment of the claim and not the claim in its entirety. *Agilent Techs., Inc. v. Synthego Corp.*, 139 F.4th 1319, 1327 (Fed. Cir. 2025). Prior art disclosures are also presumed enabling. *Id.* “Enablement of prior art requires that the reference teach a skilled artisan—at the time of filing—to make or carry out what it discloses in relation to the claimed invention without undue experimentation.” *In re Morsa*, 803 F.3d 1374, 1377 (Fed. Cir. 2015).

To determine whether experimentation would be undue, one must examine the *Wands* factors, which include: (1) the quantity of experimentation; (2) the amount of direction or guidance present; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill of those in the art; (7) the predictability or unpredictability of the art; and (8) the breadth of the claims. *Impax Lab 'ys v. Aventis Pharms. Inc.*, 545 F.3d

1312, 1314-15 (Fed. Cir. 2008).⁶ Applying these factors, Dr. Sumerlin and Dr. Spontak explain that the '924 Publication would have enabled a POSA to arrive at an embodiment encompassed within claims 1-17. EX1004, ¶¶190-196; EX1003, ¶¶90-96.

The level of skill in this field is high, as discussed in Section V, and the art (discussed at length herein) is replete with teachings about polyurethane elastomers and their uses. The '924 Publication provides detailed, working Examples 1-5 that make a polyurethane elastomer by reacting defined polyester prepolymers—specifically dilinoleic acid/propanediol copolymers—with a known multi-functional polyisocyanate crosslinker under conventional urethanation conditions to yield elastomeric gels. EX1007, ¶¶[0298]–[0303]; EX1004, ¶¶193-194. These disclosures specify the reactants, relative proportions, catalysts, reaction conditions, and resulting elastomeric products. EX1007, ¶¶[0297]–[0307]; EX1004, ¶193. In addition, the '924 Publication discloses examples that show the disclosed polyurethane elastomers can be converted into stable gels, dispersed in carrier fluids, micronized to controlled particle sizes, and formulated into cosmetic and personal care compositions that contain oil and water phases, as well as, e.g.,

⁶ Because the prior art need enable only one species and not the full scope of the claims, there is no need to determine the “breadth of the claims” factor.

vitamins and sunscreen. EX1007, ¶¶[0017], [0025], [0031]-[0035], [0295], [0297]-[0316]; EX1003, ¶93. A POSA, armed with this guidance and working examples, would have been able to reliably reproduce a polyurethane elastomer species encompassed by the '057 patent claims, and cosmetic and gel compositions containing that elastomer without engaging in undue experimentation. EX1004, ¶¶195-196; EX1003, ¶¶94-95. Accordingly, the '924 Publication provides a disclosure that is enabling for the purposes of anticipation.

B. Ground 2: Schüwer-573 anticipates claims 1-7

As discussed above, claims 1-17 are entitled to a filing date of, at best, December 14, 2022. However, even if the '057 patent claims were entitled to an August 30, 2019 filing date (they are not), claims 1-7 are still anticipated by Schüwer-573, which published in 2015, years before 2019. EX1008. As explained below, Schüwer-573 discloses each and every element of claims 1-7 of the '057 patent, arranged as claimed, and in a manner enabling to a POSA, and therefore anticipates claims 1-7.

1. Claim 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 C₃₆ dicarboxylic acid/diol copolymer”

Schüwer-573 anticipates claim 1 because it expressly discloses a cross-linked elastomer formed by reacting a polyester (polycondensate) derived from a dimer of fatty acid (such as dilinoleic acid) and a diol with a multi-functional

crosslinker. EX1004, ¶¶197-201. Specifically, Schüwer-573 describes the preparation of a polycondensate by polycondensation of a dimer fatty acid, including a dimer of linoleic acid (e.g., dilinoleic acid or under the trade name PRIPOL 1009 or PRIPOL 1006) (¶[0037]) and a diol (such as 1,4-butanediol) ([¶[0042])). EX1008, ¶¶[0032]-[0037], [0042], [0122], [0125]; EX1035, 2; EX1004, ¶199. Schüwer-573 discloses a branched C₃₆ dicarboxylic acid/diol copolymer, as dilinoleic acid is a branched 36-carbon dicarboxylic acid formed by dimerization of linoleic acid and butanediol is a diol. EX1066, Table 1, 20; EX1035, 2; EX1004, ¶199.

Schüwer-573 further discloses that this polycondensate is then mixed with a plasticizer (POLYSORB ID 37) and cross-linked with a multi-functional crosslinker, specifically a polyisocyanate (e.g., DESMODUR N3600), as described in ¶[0070] and Preparative Example 5 (¶[0126]). EX1008, ¶¶[0074], [0126]; EX1067, 12; EX1068, 1; EX1069, 1; EX1004, ¶¶200-201. The reaction of the polycondensate with the polyisocyanate yields a cross-linked elastomer. *Id.* Thus, Schüwer-573 explicitly describes each and every element of claim 1 and anticipates the claim. EX1004, ¶201.

2. Claim 2: “The cross-linked elastomer of claim 1, wherein the multi-functional crosslinker is polyisocyanate.”

Schüwer-573 discloses the use of polyisocyanates such as DESMODUR N3600. EX1008, ¶¶[0073]-[0074]; EX1004, ¶202. Preparative Example 5 provides

a concrete example where the polycondensate is cross-linked with DESMODUR N3600 which is a “commercially available aliphatic polyisocyanate crosslinking agent.” EX1008, ¶¶[0074], [00126]; EX1067, 12; EX1004, ¶202. The reaction of the polycondensate (polyester) with the polyisocyanate crosslinker yields a cross-linked elastomer, directly anticipating claim 2. EX1004, ¶202.

3. Claim 3: “The cross-linked elastomer of claim 1, wherein the diol is propanediol or butanediol.”

Schüwer-573 identifies 1,4-butanediol as a preferred diol for the polycondensate and provides concrete examples using 1,4-butanediol in the synthesis of the cross-linked elastomer. EX1008, ¶[0046]; EX1004, ¶203. Preparative Example 4 details the polycondensation of dilinoleic acid (PRIPOL 1009) with 1,4-butanediol to form the polyester. EX1008, ¶[0125]; EX1004, ¶204. This polyester is then cross-linked with a polyisocyanate, as described in Preparative Example 5, resulting in a cross-linked elastomer that falls squarely within the scope of claim 3. EX1008, ¶[0126]; EX1004, ¶204.

4. Claim 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.”

Schüwer-573 anticipates claim 4 because, in Preparative Example 5, the disclosed formulation uses 10 g of polycondensate (polyester) and 0.4 g of DESMODUR N3600. EX1008, ¶¶[0074], [0126]; EX1004, ¶¶205-207. This results in the polyester comprising approximately 96% by weight of the elastomer-

forming reactants ($10\text{ g} \div (10\text{ g} + 0.4\text{ g}) = 96\%$), which far exceeds the 60% threshold required by claim 4. EX1004, ¶206. Schüwer-573 further explains in Example 5 that the polycondensate is the primary elastomer-forming component, while the crosslinker is used in much smaller amounts. EX1008, ¶[0126]; EX1004, ¶¶206-207.

5. Claim 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.”

Schüwer-573 also anticipates claim 5 for the same reason discussed above: the polyester in Preparative Example 5 is present at approximately 96% by weight of the elastomer-forming reactants, which is well above the 75% threshold required by claim 5, satisfying claim 5. EX1008, ¶[0126]; EX1004, ¶208.

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

Schüwer-573 repeatedly emphasizes that the disclosed formulations rely on “organic based polymers,” developed specifically as an alternative to the more costly and complex silicone adhesives. EX1008, ¶¶[0009]-[0010]; EX1004, ¶209. And none of Preparative Examples 1-5 include a silicone. EX1008, ¶¶[0122]-[0127]; EX1004, ¶210. Silicone adhesive is used only in Comparative Example 3 to benchmark adhesive properties of the silicone-free elastomers against silicone elastomers. EX1008, ¶[0127], Tables 3-4; EX1004, ¶210.

7. **Claim 7: “The cross-linked elastomer of claim 1, wherein the branched C₃₆ dicarboxylic acid/diol copolymer is dilinoleic acid/propanediol copolymer or dilinoleic acid/butanediol copolymer.”**

As discussed above, Schüwer-573 discloses a dilinoleic acid/butanediol copolymer polycondensate formed from dilinoleic acid (¶[0037]) and 1,4-butanediol (¶[0042]), which is then cross-linked with a polyisocyanate to form a cross-linked elastomer. EX1008, ¶¶[0032]-[0037], [0042], [0122], [0125]-[0126]; EX1004, ¶211.

8. Schüwer-573’s disclosure is enabling.

Schüwer-573 is also an enabling disclosure for a species within claims 1-7 because it provides detailed and concrete guidance sufficient for a POSA to make and use its cross-linked polyurethane elastomers without undue experimentation. The level of skill in the art is high, as discussed above in Section V, and the art itself, also discussed above, is replete with teachings on polyurethane elastomers and their uses. Schüwer-573 does not merely describe a polyurethane elastomer species within claims 1-7 at a conceptual level, it also discloses specific starting materials, reaction pathways, stoichiometries, catalysts, processing conditions, and working preparative examples that successfully yield the claimed elastomers. EX1008, ¶¶[0122]-[0127]; EX1004, ¶¶212-217.

In particular, Schüwer-573 expressly teaches the synthesis of esterified dilinoleic acid/diol polycondensates using commercially available dimer fatty acids

(e.g., dilinoleic acid sold under the PRIPOL trade names) and defined diols (including 1,4-butanediol), followed by cross-linking with aliphatic polyisocyanates such as DESMODUR N3600. EX1008, ¶¶[0037], [0042], [0074], [0125]-[0126]; EX1004, ¶215. In addition, the disclosures of Schüwer-573 would have been further enabled to a POSA by the high level of skill in the art and the well-understood nature of polyurethane cross-linking chemistry, which were routine and predictable techniques at the time of the invention. EX1032, 114455; EX1008, ¶¶[0011], [0106]-[0117]; EX1020, ¶¶[0166]-[0178]; EX1019, 1:15-20; EX1004, ¶214.

Moreover, Schüwer-573 provides multiple preparative examples (Examples 1-5) covering variations in diol selection, molecular weight, and cross-linking conditions, confirming that the disclosed elastomer species can be reliably synthesized across a range of formulations. EX1008, ¶¶[0122]-[0127]; EX1004, ¶215. The level of detail and number of working examples leave no gaps that would require undue experimentation, and the chemistry employed—polycondensation of fatty-acid dimers followed by polyisocyanate cross-linking—was well within the ordinary skill of polymer and materials scientists at the time. EX1046, 831; EX1032, 114455; EX1004, ¶¶216-217.

The law compels finding anticipation here. The claimed cross-linked elastomers were not new—Schüwer-573 taught and enabled them.

C. Ground 3: claims 8-17 would have been obvious over Schüwer-573, Patil, and Vervier.

The law is well established that “obviousness does not require absolute predictability of success. . . . All that is required is a reasonable expectation of success.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). “[O]bviousness cannot be avoided simply by a showing of some degree of unpredictability in the art so long as there was a reasonable probability of success.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007).

Schüwer-573 taught all elements of claim 1. And there is nothing inventive about the additional limitations of claims 8-17, which were well-known in the elastomer and cosmetics fields.

As discussed in Section III.A, silicone elastomers have been used in cosmetic and personal care compositions for decades because they can provide a smooth, silky feel, provide aesthetic effects, like blurring, soft-focus, and can absorb sebum leading to a matte finish. EX1013, 207-08, 215-16; EX1014, 256–60; EX1003, ¶¶97-98. Not only that, silicone elastomers were readily used across numerous product formats: creams, serums, powders, oils, and sunscreens, for example. EX1010, 65-74; EX1013, 215-219; EX1003, ¶98. Vervier, for example, provides detailed cosmetic formulations comprising silicone elastomers for wrinkle masking, sebum absorption, and sensory effects. EX1010, 65-70; EX1003, ¶98.

Despite the benefits that silicone elastomers provided to cosmetic and

personal care products, the cosmetics and personal care industry had become increasingly aware of the perceived concerns regarding the long-term environmental impact and high cost associated with silicones, as discussed above. Regulatory and consumer pressures to adopt more sustainable and biodegradable alternatives added to that awareness. EX1009, 17-18; EX1021, 2; EX1022, 1, 6; EX1014, 65; EX1023, 165-166; EX1024, 301; EX1008, ¶[0009]; EX1003, ¶100.

Patil and other references, including Schüwer-573, documented the industry's shift toward natural and bio-based polymers, such as polyurethanes, which were recognized as viable, high-performance, and environmentally preferable alternatives to silicones in cosmetic and personal care products. EX1015, 2-7; EX1009, 17-18, 20-21; EX1016, 2825-26, 2831; EX1017, 1; EX1018, 2:23-44, 5:36-6:5, 35:24-32; EX1008, ¶¶[0011], [0027], [0090]; EX1003, ¶¶99-100. Polyurethanes offered predictable performance benefits—such as flexibility and adhesion as described in both Schüwer-573 and Patil. EX1009, 18, 20-21, 26-27; EX1003, ¶99. Moreover, the polyurethane elastomers disclosed in Schüwer-573 could be synthesized from renewable resources to meet sustainability goals. For example, as Dr. Spontak explains, 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]; EX1003, ¶99. And bio-based polyurethane elastomers made from the

same ingredients as Schüwer-573—C₃₆ dimer acid diols and polyisocyanates—were well known and used in a number of industries. EX1019, 1:23-46, 2:14-27; EX1003, ¶99.

As the Federal Circuit explained in *Uber Technologies, Inc. v. X One, Inc.*, when a known work is available in one field of endeavor, market forces and design incentives can prompt predictable variations if a POSA can implement such a predictable variation. 957 F.3d 1334, 1338-39 (Fed. Cir. 2020). Here, the state of the art—including Patil and Schüwer-573—demonstrated a clear market-driven incentive to move away from silicone-based materials due to perceived environmental and recognized cost pressures, and toward more sustainable, bio-based alternatives such as polyurethanes. *See* Section III.B. Vervier demonstrates the routine use of synthetic elastomers in cosmetic and gel compositions, Patil and Schüwer-573 describe the market-driven incentive to adopt bio-based alternatives, Patil discloses the use of polyurethanes in cosmetics, and Schüwer-573 provides the underlying polyurethane elastomer chemistry. EX1003, ¶¶99-101. Faced with these market forces and the predictable performance benefits of polyurethanes, a POSA would have been motivated to substitute bio-based polyurethane elastomers for silicone elastomers in cosmetic and personal care products and would have been able to implement that substitution. EX1003, ¶¶101-102. This is especially true because 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; EX1003, ¶101.

The combination of Schüwer-573, Patil, and Vernier thus represents a predictable and obvious variation, driven by both technical and market incentives, consistent with the flexible and expansive approach to obviousness articulated in *KSR* and applied in *Uber Technologies. KSR v. Teleflex Inc.*, 550 U.S. 398, 415 (2007). As such, each of claims 8-17 would have been obvious over Schüwer-573, Patil, and Vervier.

1. Claim 8⁷: “A cosmetic and personal care composition comprising the cross-linked elastomer of claim 1 and a carrier fluid”

Vervier’s Formula 2 expressly discloses a chocolate mousse facial product formulation containing a silicone elastomer powder and a carrier fluid, specifically cyclopentasiloxane (DC 245 Fluid, Dow Corning). EX1010, 67, 70; EX1003, ¶103. As Dr. Spontak explains, cyclopentasiloxane is widely used as a carrier fluid in cosmetic and personal care formulations. EX1025, 219S, 151S, 153S; EX1003, ¶103.

A POSA would have had a reason to replace the silicone elastomers in

⁷ Cosmetic products are a subset of personal care products, and a POSA would have understood cosmetic compositions (e.g., face creams/foundations) to constitute personal care compositions. EX1003, ¶104.

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]; EX1003, ¶104.

A POSA would have had a reasonable expectation of success in substituting Schüwer-573's polyurethane elastomer for the silicone elastomer in Vervier's Formula 2, using cyclopentasiloxane or any natural, bio-based carrier fluid, because Schüwer-573 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); EX1003, ¶105. This broad disclosure demonstrates that the polyurethane elastomer compositions of Schüwer-573 are compatible with a wide range of cosmetic carrier fluids, thereby supporting the predictability and success of such a substitution. EX1003, ¶105. Accordingly, claim 8 would have been obvious over Schüwer-573, Patil, and Vervier. EX1003, ¶106.

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

Vervier's Formula 2 expressly 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; EX1003, ¶107. Specifically, Formula 2

includes water together with multiple oils forming an oil phase, including cyclopentasiloxane, cocoa butter, coconut oil, and additional emollient oils.

EX1010, 70; EX1003, ¶107. As Dr. Spontak explains, such multi-phase (oil-in-water or water-in-oil) cosmetic formulations were well known and routinely used in personal care products to achieve desirable texture, stability, and sensory properties. EX1026, 1; EX1003, ¶¶107-108.

A POSA would have been motivated to replace Vervier's silicone elastomer with Schüwer-573's bio-based polyurethane elastomers in view of the clear market-driven shift away from silicone materials due to perceived environmental and mounting cost pressures and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]; EX1003, ¶108.

A POSA would have reasonably expected to successfully substitute Schüwer-573's polyurethane elastomer for the silicone elastomer in Vervier's Formula 2 while retaining both the water phase and the oil phase in that formulation, because Schüwer-573 expressly teaches compatibility of its disclosed polyurethane elastomers with essentially any cosmetic oil additive and permits formulating the elastomer with additional solvents commonly used in topical compositions, which includes water. EX1008, ¶¶[0088], [0104]; EX1003, ¶109. This substitution represents a predictable and routine variation in cosmetic

formulation practice, supported by the express disclosures of Schüwer-573 and Vervier's chocolate mousse facial product formulation. EX1003, ¶109.

Accordingly, claim 9 would have been obvious over Schüwer-573, Patil, and Vervier. EX1003, ¶110.

3. 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).

As discussed above, a POSA would have been motivated to replace the silicone elastomer in Vervier's Formula 2 with Schüwer-573's bio-based polyurethane elastomers with a reasonable expectation of success in view of the clear market-driven shift away from silicone-based materials due to perceived environmental and mounting cost pressures, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]; EX1003, ¶112.

Vervier's Formula 2 expressly discloses a chocolate mousse facial product formulation that includes a fragrance component, “Chocolat Crème 0310585, Expressions Parfumées,” a plant extract, specifically “*Gardenia tahitensis* flower extract,” in addition to a silicone elastomer powder, and a carrier fluid. EX1010, 70; EX1003, ¶111. As Dr. Spontak explains, including fragrances and plant extracts, such as flower extracts, in cosmetic and personal care compositions was

conventional and routinely employed to enhance consumer sensory perception.

EX1027, 15, 20; EX1003, ¶112.

A POSA would also have reasonably expected to successfully in retain Vervier's fragrance and flower extract components when substituting Schüwer-573's polyurethane elastomer for the silicone elastomer because Schüwer-573 expressly teaches that its disclosed polyurethane elastomer compositions may include "plant extracts" and "fragrant/refreshing materials." EX1008, ¶¶[0094], [0113]; EX1003, ¶113. This express disclosure confirms that fragrances and plant extracts are fully compatible with Schüwer-573's polyurethane elastomer compositions and may be incorporated without adversely affecting formulation stability or performance. EX1003, ¶113. Accordingly, including a fragrance or plant extract in a cosmetic and personal care composition comprising Schüwer-573's polyurethane elastomers represents a predictable and routine formulation choice, fully supported by the express teachings of Schüwer-573 and Vervier's Formula 2. EX1003, ¶113. Claims 10 and 11 therefore would have been obvious over Schüwer-573, Patil, and Vervier. EX1003, ¶114.

4. 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."

Vervier expressly discloses that its elastomer-containing formulations are suitable for facial cosmetic 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, specifically cyclopentasiloxane. EX1010, 66-67; EX1025, 219S; EX1003, ¶115.

As discussed above, a POSA would have been motivated to replace the silicone elastomers in Vervier’s facial formulations with Schüwer-573’s bio-based polyurethane elastomers in light of the recognized market-driven shift away from silicone-based materials, and the well-known use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]; EX1003, ¶116. A POSA would also have reasonably expected to successfully formulate Schüwer-573’s polyurethane elastomers into facial creams as these represent predictable and routine cosmetic formulation choices. EX1003, ¶116. As Patil explains, polyurethanes were well recognized for use in foundations, skin-care products, and lipsticks, and a POSA would therefore have expected Schüwer-573’s polyurethane elastomers to be readily adaptable to these cosmetic formats. EX1009, 17-18, 20-21; EX1003, ¶¶116-117.

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

Claim 13 requires a gel composition comprising a cross-linked elastomer dispersed in a carrier fluid, and Vervier’s Formula 3 discloses such a gel foundation formulation (Formula 3) in which a silicone elastomer is dispersed in a carrier fluid, specifically cyclopentasiloxane. EX1010, 72; EX1025, 219S;

EX1003, ¶118. As discussed above, a POSA would have been motivated to replace the silicone elastomer in Vervier's gel foundation Formula 3 with Schüwer-573's bio-based polyurethane elastomers in view of the clear market-driven shift away from silicone-based materials due to perceived environmental and mounting cost pressures, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]; EX1003, ¶119.

A POSA also would have reasonably expected to successfully replace the silicone elastomers with Schüwer-573's polyurethane elastomers as a gel composition dispersed in a carrier fluid, because Schüwer-573 expressly teaches that its cross-linked elastomer compositions are largely composed of gels with an "adhesive gel content" of "between 60% and 95%." EX1008, ¶[0087]; EX1003, ¶120. Schüwer-573 further discloses formulating elastomeric gels with oil additives that serve as carrier fluids, analogous to Vervier's elastomer-in-carrier-fluid gel formulation. EX1008, ¶[0088]; EX1003, ¶120.

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. Indeed, Schüwer-573 discloses a large number of carrier fluids in the form of oil additives that are suitable for topical application to the human skin. EX1008, ¶[0088]; EX1003, ¶¶120-121. Accordingly, claim 13 would have been obvious

over Schüwer-573, Patil, and Vervier.

6. **Claims 14, 15, and 16: “The gel composition of claim 13, the cross-linked elastomer is in micronized form” (claim 14), “the 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).**

Vervier expressly discloses that the silicone elastomer used in its gel foundation formulation (Formula 3) is in micronized form. In particular, Vervier explains—illustrated in Figure 1—that the silicone elastomer consists of spherical particles having an average size of approximately 1-10 μm . EX1010, 66, Fig. 1; EX1003, ¶122. Vervier further teaches that this spherical, micronized structure “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; EX1003, ¶122. Thus, Vervier discloses the advantages of micronized elastomer particles. EX1003, ¶122.

As discussed above, a POSA would have had a reason to replace the silicone elastomer in Vervier’s gel foundation with Schüwer-573’s bio-based polyurethane elastomers in view of the clear market-driven shift away from silicone-based materials due to perceived environmental and mounting cost pressures, and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]; EX1003, ¶123. Moreover, a POSA would have been specifically motivated to micronize Schüwer-573’s polyurethane

elastomers to mirror the particle size and spherical morphology disclosed in Vervier, because—just as Vervier explains for silicone elastomers—micronized elastomer spheres provide free-flowing behavior, resist agglomeration, and facilitate dispersion into gel formulations without specialized processing. EX1010, 66; EX1028, 748; EX1003, ¶124.

A POSA also would have had a reasonable expectation of success in providing Schüwer-573's polyurethane elastomers in “micronized form,” with “a particle size from 1 to 100 microns,” and with a particle size “less than 60 microns” when substituting them for the silicone elastomer disclosed in Vervier's Formula 3. EX1003, ¶125. 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 particle formation. EX1003, ¶¶125-126.

Accordingly, claims 14-16 are obvious over the combination of Schüwer-573, Patil, and Vervier.

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

Vervier's Formula 3 expressly discloses a gel composition having a measured viscosity of approximately 35,000 to 40,000 cP, which falls squarely within the viscosity range recited in claim 17. EX1010, 70; EX1003, ¶127. Vervier teaches that its high-viscosity gel enables pump dispensing and forms a thick,

creamy composition that becomes fluid upon application for easy spreading, thereby illustrating the functional advantages of high-viscosity gel formulations. EX1010, 69; EX1003, ¶127.

As discussed above, a POSA would have been motivated to substitute the silicone elastomer in Vervier's gel foundation with Schüwer-573's bio-based polyurethane elastomers in view of the demonstrated market-driven shift away from silicone-based materials due to perceived environmental and mounting cost pressures and the disclosed use of polyurethanes in cosmetic products, as described by Patil. EX1009, 18, 20-21; EX1008, ¶¶[0009], [0011]; EX1003, ¶128. As Dr. Spontak explains, a POSA would have been motivated to retain the viscosity of Vervier's gel foundation to preserve its demonstrated spreadability benefits. EX1010, 69; EX1003, ¶128.

A POSA would have had a reasonable expectation of successfully achieving viscosities within the claimed range when making this substitution. As Dr. Spontak explains, 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. EX1014, 50; EX1010, 70; EX1003, ¶129. Indeed, Vervier discloses that this viscosity is achieved through formulation and processing, specifically by combining the ingredients using turbulent mixing at approximately

1400 rpm, followed by a reduction in stirring speed, which causes the viscosity of the composition to “rapidly increase.” EX1010, 72; EX1003, ¶129.

Schüwer-573 similarly discloses preparing 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]; EX1003, ¶130. Moreover, Schüwer-573’s Preparative Example 5 discloses manually homogenizing the elastomer composition to form a “clear viscous paste,” a description that reflects a composition of even higher viscosity. EX1008, ¶¶[0122]-[0126]; EX1003, ¶130. Patil also discloses that polyurethanes are added to formulations to “increase product viscosity.” EX1009, 26; EX1003, ¶131. Thus, in view of Vervier’s express disclosure of a gel composition having a viscosity squarely within the claimed range, and Schüwer-573’s teachings demonstrating the formation of viscous elastomer-based gels, a POSA would have had a reasonable expectation of success in arriving at claim 17 in view of Schüwer-573, Patil, and Vervier. Thus, claim 17 is obvious. EX1003, ¶¶132-133.

X. NO SECONDARY CONSIDERATIONS

To the extent Grant alleges secondary considerations exist, Momentive respectfully submits such issues should be addressed after institution. EX1003, ¶134.

XI. DISCRETIONARY DENIAL IS NOT WARRANTED

Discretionary denial is not warranted. There is no parallel district court or ITC litigation involving the '057 patent, no risk of duplicative proceedings, and no overlapping forum in which validity is being adjudicated. Because the '057 patent issued less than a year ago, there are no settled expectations or reliance interests that would weigh against institution.

Discretionary denial under § 325(d) is likewise unwarranted. The grounds asserted here were not meaningfully considered during prosecution. The Examiner did not evaluate the priority defects identified in this Petition, did not treat the '924 Publication as prior art, and did not address anticipation on that basis. Neither Grant nor the Examiner cited Schüwer-573, Patil, or Vervier during prosecution. Nor did the Examiner consider the specific combinations, rationales, and expert-supported technical analysis presented here. Moreover, the art cited here demonstrates that the Examiner's reasons for allowance rested on a flawed understanding of the pre-2019 state of the art.

The Petition also presents compelling merits, as explained in detail in the Grounds discussed herein.

In sum, there is no parallel litigation, delay or gamesmanship, no settled expectations, and no prior Office consideration that would justify discretionary denial. This Petition raises substantial, previously unconsidered questions of

patentability, and the Board should institute *inter partes* review.

**XII. CERTIFICATION THAT THE PATENT MAY BE CONTESTED VIA
INTER PARTES REVIEW BY THE PETITIONER AND STANDING
(37 C.F.R. § 42.104(A))**

Momentive Performance Materials Inc. certifies that the '057 patent is available for IPR and that Momentive Performance Materials Inc. is not barred or estopped from requesting IPR of any '057 patent claim.

XIII. MANDATORY NOTICES (37 C.F.R. § 42.8(A)(1))

Real Party-in-Interest (37 C.F.R. § 42.8(b)(1)): The real party-in-interest is Momentive Performance Materials Inc., KCC Corporation, KCC Silicone Co. Ltd., and MPM USA LLC.

Related Matters (37 C.F.R. § 42.8(b)(2)): The '057 patent claims priority to U.S. Patent Application No. 16/992,831, now U.S. Patent No. 11,534,389, issued August 13, 2020.

Pending U.S. Patent Application Nos. 19/222,604, filed May 29, 2025, and 19/065,593, filed February 27, 2025, claim priority from the '057 patent.

Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3)) for Momentive Performance Materials Inc. are:

Lead Counsel	Back-Up Counsel
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Service Information (37 C.F.R. § 42.8(b)(4)): Please direct all correspondence regarding this Petition to counsel at the above addresses and PTAB@sternekessler.com. Momentive Performance Materials Inc. consents to service by email at the addresses above.

Procedural Statements: This Petition is filed in accordance with 37 C.F.R. § 42.106(a). Concurrently filed herewith are a Power of Attorney and Exhibit List under 37 C.F.R. §§ 42.10(b) and 42.63(e), respectively. The required fee is paid through Deposit Acct. No. 19-0036 (Customer ID No. 45324). The Office is authorized to charge any fee deficiency, or credit any overpayment, to Deposit Acct. No. 19-0036 (Customer ID No. 45324).

XIV. CONCLUSION

The challenged claims are unpatentable as anticipated and obvious, and IPR is warranted.

Respectfully submitted,
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/Deborah A. Sterling/

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CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

1. This Petition for *Inter Partes* Review complies with the type-volume limitation of 14,000 words, comprising 13,865 words, excluding the parts exempted by 37 C.F.R. § 42.24(a)(1).

2. This Petition for *Inter Partes* Review complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman font.

Respectfully submitted,
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CERTIFICATE OF SERVICE (37 C.F.R. §§ 42.6(e), 42.105(a))

I certify that the above-captioned **PETITION FOR *INTER PARTES***
REVIEW FOR U.S. PATENT NO. 12,337,057 and associated Exhibits 1001-
1070 were served in their entirety upon the Patent Owner on September 21, 2026,
via FedEx® Express at the following address:

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UNITED STATES
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