



subject patents, commonly referred to as a *Markman* hearing. See *Markman v. Westview Instruments*, 517 U.S. 370 (1996). Prior to the *Markman* hearing, on July 1, 2013, the parties conducted a tutorial for the benefit of the Court, wherein the technology behind the patent-in-suit was explained. At the Court's request, the parties submitted pre-hearing briefs on a variety of issues relating to claim construction, as well as a post-hearing stipulated revised construction of claim terms. Upon consideration of the parties' briefs, argument, and the presentation of exhibits, the Court construes the disputed terms as set forth herein.

## **I. BACKGROUND**

For purposes of this litigation, Zecotek is the holder of United States Patent No. 7,132,060 (the "060 patent"). It covers substances that emit light when exposed to radiation, called "scintillation substances." The substances are man-made in laboratories; they do not occur naturally. Here, the substances are crystals, manufactured in two ways: 1) the "growth" method, where the crystal is "grown" from a heated molten charge called a "melt"; and 2) the "sintering" method, where multiple crystals are "sintered" together through heat and pressure.

The "growth" process begins with raw elements in powder form. Those elements are mixed together to form a "charge." The charge is placed into an oven called a "crucible," which heats the charge to high temperatures, at which the charge liquefies into a "melt." At this point, a rod with a crystal on the end called a "seed" crystal is inserted into the molten material, then slowly removed from the melt as the crystal forms around the seed crystal. After the crystal is grown, it cools into its final form, called a "boule" or "ingot."

“Sintering” is different; there is an initial charge, but no melt is involved. The starting materials are fused together through heat and pressure. In sintering, the powdered starting materials remain in their solid state.

After the boule forms, it is cut into smaller crystals called “pixels,” which are used in a variety of industries, including medical imaging devices.

## II. LEGAL STANDARD

Claim construction is a matter of law to be decided exclusively by the Court. *Markman v. Westview Instruments*, 52 F.3d 967, 970-71 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). “[T]he claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Innova/Pure Water, Inc. v. Safari Water Filtration Sys.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004). Claim terms are “generally given their ordinary and customary meaning.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (quoting *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). “The ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective date of the patent application.” *Id.* at 1313. Absent an express intent to the contrary, a patentee is presumed to have intended the ordinary meaning of a claim term. *York Prods. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1572 (Fed. Cir. 1996).

In determining the proper construction of a claim, a court begins with the intrinsic evidence of record, consisting of the claim language, the patent specification, and the prosecution history (if in evidence). *Phillips*, 415 F.3d at 1313. “Such intrinsic evidence is the most significant source of the legally operative meaning of disputed claim language.” *Vitronics*, 90

F.3d at 1582. “The appropriate starting point . . . is always [] the language of the asserted claim itself.” *Comark Communications v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed. Cir. 1998).

The claims also “must be read in view of the specification, of which they are a part.” *Phillips*, 445 F.3d at 1315. The specification “is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Vitronics*, 90 F.3d at 1582. By expressly defining terms in the specification, an inventor may “choose . . . to be his or her own lexicographer,” thereby limiting the meaning of the disputed term to the definition provided in the specification. *Johnson Worldwide Assocs., Inc. v. Zebco Corp.*, 175 F.3d 985, 990 (Fed. Cir. 1999). Although claims are interpreted in light of the specification, this “does not mean that everything expressed in the specification must be read into all the claims.” *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 957 (Fed. Cir. 1983). For instance, limitations from a preferred embodiment described in the specification generally should not be read into the claim language. *See Comark*, 156 F.3d at 1187. However, it is a fundamental rule that “claims must be construed so as to be consistent with the specification.” *Phillips*, 415 F.3d at 1316. Therefore, if the specification reveals an intentional disclaimer or disavowal of claim scope, the claims must be read consistent with that limitation. *Id.*

In most circumstances, analysis of the intrinsic evidence alone will resolve claim construction disputes. *See Vitronics*, 90 F.3d at 1583. Extrinsic evidence may be considered, as it “can shed light on the relevant art,” but it is less significant than the intrinsic record in determining the “legally operative meaning of disputed claim language.” *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004) (quoting *Vanderlande Indus. Nederland BV v. ITC*, 366 F.3d 1311, 1318 (Fed. Cir. 2004)). Courts should not rely on extrinsic evidence in

claim construction to contradict the meaning of claims discernable from examination of the claims, the written description, and the prosecution history. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1308 (Fed. Cir. 1999) (citing *Vitronics*, 90 F.3d at 1583). However, the court may appropriately consult “trustworthy extrinsic evidence to ensure that the claim construction it is tending to from the patent file is not inconsistent with clearly expressed, plainly apposite, and widely held understandings in the pertinent technical field.” *Id.* Extrinsic evidence “consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Phillips*, 415 F.3d at 1317. All extrinsic evidence should be evaluated in light of the intrinsic evidence. *Id.* at 1319.

In construing claims, the Court determines whether or not a term requires construction. *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). The Court is not required to accept a construction of a term, even if the parties have stipulated to it, but instead may arrive at its own construction of claim terms, which may differ from the constructions proposed by the parties. *Pfizer, Inc. v. Teva Pharms, USA, Inc.*, 429 F.3d 1364, 1376 (Fed. Cir. 2005).

### **III. THE DISPUTED CLAIMS AND THE COURT’S CLAIM CONSTRUCTION**

#### **A. “based on a silicate comprising a lutetium (Lu) and cerium (Ce) characterized in that the composition of the substance [ . . . ] is represented by the chemical formula”**

The above language appears in the asserted independent Claims 1 and 5. Plaintiffs advocate for the construction, “cerium-activated lutetium oxyorthosilicate represented by the following chemical formula:.” Defendants initially urged the construction, “A scintillation substance having a nonstoichiometric congruent composition of the total basic components of lutetium (Lu) and cerium (Ce) [ . . . ] and silicon (Si) wherein the composition of both the

substance and the initial charge of the melt from which it is grown have the same chemical formula.” During the *Markman* hearing, defendants announced an amendment to their proposed construction to remove “of the melt from which it is grown.” (Doc. No. 133 at 1884.)

The dispute focuses on three parts of defendants’ construction: “nonstoichiometric,” “congruent,” and “the composition of both the substance and the initial charge.” The crux of the issue is whether the claim language refers to only the substance, or whether it can also refer to the charge and/or melt. All clear signs point to the conclusion that Claims 1 and 5 only discuss the final substance, not the charge or the melt.

First, Claims 3 and 4, which are “method” claims, show that the patentee knew how to claim aspects of the charge and melt when it sought to. Claims 3 and 4 describe single crystals made from differing methods, specifying that the melt is made from a charge with a particular molar ratio of rare earth elements to silicon. Patent at 34:60–35:2. Claims 1 and 5 purport only to describe the composition of the final substance.

Moreover, the specification defines a “congruent composition” as that in which the composition of the melt and the composition of the crystal grown from the melt are the same. Patent at 6:60–64.<sup>1</sup> Thus, if “congruent” is included in the claim language, it necessarily refers to

---

<sup>1</sup> Plaintiffs claim that the “congruent composition” occurs at one specific point within the broader range of compositions described in the claim language. Defendants respond that plaintiffs use the term “congruent composition” to refer to the entire range. (Doc. No. 133 at 1890.) The specification does describe a “range of compositions.” Patent at 16:12–30. Plaintiffs characterized this range at the hearing as being “near-congruence or slightly off-congruence,” but definitely broader than simply encompassing the point of congruency. (Doc. No. 133 at 1853.) Defendants interpret plaintiffs’ definition of “congruent” to mean “that you start and end up with the same formula,” and that that “captures a range of formulas.” (Doc. No. 133 at 1911.)

The specification is ambiguous in its use of “congruent.” In describing the same formulas that appear in Claims 1 and 5, the specification refers to “the use of a substance based on a silicate having the congruent composition of basic components.” Patent at 8:63–67; 9:47–57. Immediately after discussion of the Claim 1 formula, however, the patent describes the single crystal resulting from the formula appearing in Claim 2 as if it were the only “congruent composition.” *See* Patent at 9:22–35. This is the singular “point” that plaintiffs claim constitutes the only

more than simply the final substance, namely the melt. Because the sintering process that produces a ceramic substance does not involve a melt, a ceramic substance cannot be a “congruent composition” as it is defined in the patent. But the parties agree that Claims 1 and 5 cover both single crystals and ceramics. Consequently, language related to congruence cannot be used to construe those claims, because it would read ceramics out entirely.

In addition, defendants’ construction attaching the formula to “the composition of both the substance and the initial charge” is untenable, as the charge is a “raw” mix of powder that has a molar ratio, but is not “bonded together” to produce a formula.

With respect to “nonstoichiometric,” defendants agreed that the problem of whether Claim 1 refers to only the final product or also to the starting composition would not be solved by adding the term “nonstoichiometric” to the claim. (Doc. No. 133 at 1948.) Plaintiffs admit that the patents cover only nonstoichiometric substances, but they object to inclusion of the term on grounds that it is nondispositive and could confuse the jury. (Doc. No. 133 at 1849.) Since the claim language is construed as only referring to the substance, addition of the term “nonstoichiometric” would needlessly complicate the claims.

Accordingly, the Court adopts plaintiffs’ construction, “cerium-activated lutetium oxyorthosilicate represented by the following chemical formula:.”

---

circumstances that result in a “congruent composition.” Thus, it is unclear whether plaintiffs are referring to only one point, or to the entire range in the formulas. Regardless, “congruent” is defined to require a melt, and to read “congruent” into Claims 1 and 5 would read out the meltless ceramics. Plaintiffs’ additional argument using the doctrine of claim differentiation fails because it is dependent upon a determination that “congruent” refers to only one point.

## **B. “scintillation substance/scintillating substance”**

Plaintiffs propose “A substance that emits light when exposed to ionizing radiation.” Defendants offer “A substance that emits optical ionizing radiation, such substances including but not limited to phosphors, ceramics, crystals, organic liquids, and plastics.” At the *Markman* hearing, defendants narrowed the difference between their constructions by agreeing that a “scintillation substance/scintillating substance” is a substance “that emits light.” (Doc. No. 133 at 1969–70.) The only remaining dispute, then, is over whether a nonexclusive list of examples of such substances should be included in the claim language.

Plaintiffs believe defendants seek to introduce the examples in order to tee up their invalidity argument. (Doc. No. 133 at 1971.) Moreover, some of the proposed examples, “organic liquids and plastics,” are not mentioned in the patent, and the term “organic liquids” is confusing in itself. (Doc. No. 133 at 1971–72.) Defendants believe the examples will be helpful to the jury when it is presented with prior art having to do with scintillation substances in those other forms. (Doc. No. 120 at 1592.)

The Court agrees with plaintiffs that it would be improper and unnecessary to add defendants’ proposed nonexclusive list of examples to the definition of “scintillation substance/scintillating substance.” The agreed-upon portion of the parties’ constructions suffices to properly clarify what is meant by the construed term. Accordingly, the Court adopts plaintiffs’ proposed construction: “A substance that emits light when exposed to ionizing radiation.”

## **C. “single crystal”**

Plaintiffs would construe this language as “A substance having a monocrystalline form,” or, alternatively, “A solid monocrystalline object in which a three-dimensional



arrangement of atoms is substantially repeated throughout the object.” Defendants would have it construed as “A solid object in which an orderly three-dimensional arrangement of the atoms, ions, or molecules is substantially repeated.”

With respect to their alternative construction, plaintiffs admitted at the hearing that “monocrystalline” would be unnecessary if the construction contained “throughout the object.” (Doc. No. 133 at 1976.) Defendants agreed with such a construction (Doc. No. 133 at 1976), and the Court accepts it. Consequently, the adopted construction is “A solid object in which an orderly three-dimensional arrangement of the atoms, ions, or molecules is substantially repeated throughout the object.”

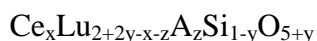
**D. “ $A_z$  . . . where A is at least one element selected from the group consisting of . . . z is a value between  $1 \times 10^{-4}$  f.u. and 0.05 f.u.”**

After the *Markman* hearing, the parties conferred and offered revised proposed constructions. (Doc. No. 132.) Plaintiffs’ proposed construction is “[ $A_z$  . . . where] A is at least one element selected from gadolinium (Gd), scandium (Sc), yttrium (Y), lanthanum (La), europium (Eu), terbium (Tb), and calcium (Ca) that is added as a separate ingredient or component to the charge in an amount ranging from  $1 \times 10^{-4}$  to 0.05 formula units.” Defendants have offered “ $A_z$  . . . where A is at least one element selected from the group consisting of Gd, Sc, Y, La, Eu, Tb, and Ca . . . and z is a value between  $1 \times 10^{-4}$  f.u. and 0.05 f.u. representing the sum of the contents of Gd, Sc, Y, La, Eu, Tb, and Ca that are added as separate ingredients or components to the charge.”

The crux of the dispute here centers on the phrase “the sum of the contents.” Defendants argue that the combined amount of all of the listed elements must stay within the

range provided for z, while plaintiffs believe that it is the individual amounts of each element added that must do so, and therefore that the sum can exceed that amount.

As defendants explained, the formula provided in Claim 5 shows that the elements making up the group labeled “A” are intended to replace some portion of lutetium: *See* Patent at 35:3–10.



“A” is ascribed the quantity “z,” which is the same amount subtracted from the quantity of lutetium. The idea behind replacing some lutetium with one or more of the elements from group “A” is that the “A” elements are cheaper and lighter than lutetium, but have similar chemical properties. As a matter of common sense, considering that the molar ratio of rare earth elements to silicon is of paramount importance, *See, e.g.*, Patent at 9:22–35, the amount of “A” elements added must equal the amount of Lutetium taken away. Under plaintiffs’ construction, if they wanted to use all seven of the “A” elements to replace one unit of Lutetium, they could effectively add as much of six of the group members as they wanted, as long as the seventh was present in a quantity within the range of z. That construction would also create arbitrary and irrational limits based on how many different elements were used to replace the Lutetium: for example, if only Yttrium were used, only the amount z could be added to replace z amount of Lutetium, but if one other “A” element were added, it could be added in any amount.

*Biagro Western Sales, Inc. v. Grow More, Inc.*, 423 F.3d 1296 (Fed. Cir. 2005) supports defendants’ already seemingly unassailable construction. There, the claim language at issue related to the amount of phosphorous-containing acid or salt in a fertilizer compound. The amount of the acid or salt was limited to “about 30 to about 40 weight percent.” *Id.* at 1299.

Biagro argued that the claim limitation was met if one acid or salt was present in that amount, even if the fertilizer contained other such acids or salts. *Id.* at 1304. The court affirmed the district court’s decision that the amount of acids and salts must be aggregated. *Id.* It was “apparent from the written description that all phosphorous-containing acids or salts in the fertilizer serve the same purpose such that the total amount of such acids or salts is important.” *Id.* The patentee also emphasized that the concentration of the acids or salts was important. *Id.*

Just as in *Biagro*, it is clear here that all of the rare earth elements used as substitutes for Lutetium serve the same purpose, and the patentee made clear that the molar ratio of the rare earth elements to silicon was important. Accordingly, the Court adopts defendants’ proposed construction.

**E. “ $\text{La}_m \dots m$  is a value not exceeding 0.05 f.u.,”**

Subsequent to the briefing, the parties stipulated to the following construction, which the Court accepts: “ $\text{La}_m \dots m$  is the amount of La greater than zero and not exceeding 0.05 f.u. that is added as a separate ingredient or component to the charge.”

## **F. Chemical Symbols**

Plaintiffs believe that the Court should “define” the various symbols from the periodic table of elements used in the patent. With the exception of the abbreviation f.u., which stands for “formula unit,” the proposed definitions are simply the full names of the elements contained in the disputed claims. To the extent that the full names may make the meaning of the claims easier to understand, the full names of the symbols and terms may be included in the definition of each claim.

**IT IS SO ORDERED.**

Dated: May 13, 2014

  
\_\_\_\_\_  
**HONORABLE SARA LIOI**  
**UNITED STATES DISTRICT JUDGE**