

Commissioner's Decision #1512  
Décision du commissaire n° 1512

TOPICS: G00 Utility  
B22 Not Supported by Disclosure  
B00 Ambiguity or Indefiniteness

SUJETS : G00 Utilité  
B22 Non appuyée par la divulgation  
B00 Caractère ambigu ou indéfini

Application No. 2,662,750

Demande n° 2 662 750

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Patent application number 2,662,750, having been rejected under subsection 30(3) of the *Patent Rules* [SOR/96-423], as they read before October 30, 2019 [the *former Patent Rules*], has subsequently been reviewed in accordance with paragraph 199(3)(c) of the *Patent Rules* [SOR/2019-251]. The recommendation of the Patent Appeal Board and the decision of the Commissioner is to refuse the application.

Applicant:

**DESBRANDES, ROBERT**  
1 Allée des Chériniers  
Givarlais  
03190  
France



## INTRODUCTION

- [1] This recommendation concerns the review of rejected Canadian patent application number 2,662,750, which is entitled “Method and Apparatus for Remote Communication Using the Interpretation of Thermoluminescence or Photoluminescence Signals” and is owned by Robert Desbrandes (the Applicant). A review of the rejected application has been conducted by the Patent Appeal Board (the Board) pursuant to paragraph 199(3)(c) of the *Patent Rules*.
- [2] As explained in more detail below, our recommendation is that the Commissioner of Patents refuse the application.

## BACKGROUND

### *The Application*

- [3] The patent application was filed in Canada on March 26, 2007 under the provisions of the *Patent Cooperation Treaty* and was made available to the public on January 10, 2008.
- [4] The application relates generally to a method and apparatus for remote communications using photoluminescence or thermoluminescence of quantum-entangled particles (entangled particles).

### *Prosecution History*

- [5] On June 10, 2016, a Final Action (FA) was issued pursuant to subsection 30(4) of the *former Patent Rules*. The FA rejected the application and noted the following defects:
- claims 1 through 38 encompass subject matter that lacks utility and thus do not comply with section 2 of the *Patent Act*;
  - the description does not correctly and fully describe the invention, its operation and its use and thus does not comply with paragraph 27(3)(d) of the *Patent Act*;

- claims 31 and 32 lack support and thus do not comply with section 84 of the *former Patent Rules*; and
- claims 1, 5 to 9, 30 and 35 are indefinite and thus do not comply with subsection 27(4) of the *Patent Act*.

[6] In a response to the FA (RFA) received on December 12, 2016, the Applicant submitted arguments for allowance of the application and proposed an amended set of 38 claims (proposed claim set-1).

[7] The Examiner was not persuaded by the Applicant's arguments to withdraw the rejection of the application and considered that proposed claim set-1 did not remedy all of the defects. Therefore, pursuant to subsection 30(6)(c) of the *former Patent Rules*, the application was forwarded to the Board for review, along with an explanation outlined in a Summary of Reasons (SOR). In a letter dated January 25, 2017, the Board forwarded a copy of the SOR to the Applicant.

[8] The present panel (the Panel) was formed to review the instant application under paragraph 30(6)(c) of the *former Patent Rules*. The Panel sent a Preliminary Review (PR) letter to the Applicant on July 4, 2019.

[9] The Applicant declined the opportunity for a hearing. In a written response to the PR letter (RPR) dated August 15, 2019, the Applicant provided written submissions and a proposed set of claims (proposed claim set-2).

## ISSUES

[10] The issues to be addressed in the present review are whether:

- claims 1 through 38 encompass subject matter that lacks utility and thus do not comply with section 2 of the *Patent Act*;
- the description does not correctly and fully describe the invention, its operation and its use and thus fails to comply with paragraph 27(3)(d) of the *Patent Act*;

- claims 31 and 32 lack support and thus do not comply with section 60 of the *Patent Rules*; and
- claims 1, 5 to 9, 30 and 35 are indefinite and thus do not comply with subsection 27(4) of the *Patent Act*.

[11] If the claims on file are considered defective, we may turn to proposed claim set-2 and consider whether they constitute amendments necessary for compliance with the *Patent Act* and *Patent Rules*.

## LEGAL PRINCIPLES AND OFFICE PRACTICE

### *The Person of Ordinary Skill in the Art (POSITA)*

[12] The examination of the utility, the sufficiency of the specification and the lack of clarity of the claims is based on an understanding of the POSITA. In *AstraZeneca Canada Inc v Apotex Inc*, 2014 FC 638, at para 51, it is noted:

The skilled person is a notional person used by the courts to ensure that patents are read in an “informed” way. For the purpose of patent law, and as a reflection of reality, patents are notionally addressed to a skilled person rather than an ordinary member of the public. The skilled person is “deemed to be unimaginative and uninventive, but at the same time is understood to have an ordinary level of competence and knowledge incidental to the field to which the patent relates and to be reasonably diligent in keeping up with advances.” Additionally, the skilled person can come from a single discipline, or reflect a combination of multiple disciplines, depending on the nature of the patent: *Merck & Co v Pharmascience Inc*, 2010 FC 510, at paras 34-40 [*Merck finasteride*].

### *Common General Knowledge*

[13] The assessment of common general knowledge (CGK) is governed by the principles set out in *Eli Lilly & Co v Apotex Inc*, 2009 FC 991, at para 97 [*Eli Lilly*], aff’d by 2010 FCA 240, citing *General Tire & Rubber Co v Firestone Tyre & Rubber Co* [1972] RPC 457, [1971] FSR 417 (UKCA) (*General Tire*), at pp. 482-483 (of the RPC):

The common general knowledge imputed to such an addressee must, of course, be carefully distinguished from what in patent law is regarded as public knowledge. This distinction is well explained in Halsbury’s Law

of England, Vol. 29, para. 63. As regards patent specifications it is the somewhat artificial (see per Lord Reid in the *Technograph* case [1971] F.S.R. 188 at 193) concept of patent law that each and every specification, of the last 50 years, however unlikely to be looked at and in whatever language written, is part of the relevant public knowledge if it is resting anywhere in the shelves of the Patent Office. On the other hand, common general knowledge is a different concept derived from a commonsense approach to the practical question of what would in fact be known to an appropriately skilled addressee – the sort of man, good at his job, that could be found in real life.

The two classes of documents which call for consideration in relation to common general knowledge in the instant case were individual patent specifications and “widely read publications”.

As to the former, it is clear that individual patent specifications and their contents do not normally form part of the relevant common general knowledge, though there may be specifications which are so well known amongst those versed in the art that upon evidence of that state of affairs they form part of such knowledge, and also there may occasionally be particular industries (such as that of colour photography) in which the evidence may show that all specifications form part of the relevant knowledge.

As regards scientific papers generally, it was said by Luxmoore, J. in *British Acoustic Films* (53 R.P.C. 221 at 250):

“In my judgment it is not sufficient to prove common general knowledge that a particular disclosure is made in an article, or series of articles, in a scientific journal, no matter how wide the circulation of that journal may be, in the absence of any evidence that the disclosure is accepted generally by those who are engaged in the art to which the disclosure relates. piece of particular knowledge as disclosed in a scientific paper does not become common general knowledge merely because it is widely read, and still less because it is widely circulated. Such a piece of knowledge only becomes general knowledge when it is generally known and accepted without question by the bulk of those who are engaged in the particular art; in other words, when it becomes part of their common stock of knowledge relating to the art.” And a little later, distinguishing between what has been written and what has been used, he said:

“It is certainly difficult to appreciate how the use of something which has in fact never been used in a particular art can ever be held to be common general knowledge in the art.”

Those passages have often been quoted, and there has not been cited to us any case in which they have been criticised. We accept them as correctly stating in general the law on this point, though reserving for further consideration whether the words “accepted without question” may not be putting the position rather high: for the purposes of this case we are disposed, without wishing to put forward any full definition, to

substitute the words “generally regarded as a good basis for further action.”

### *Utility*

[14] Section 2 of the *Patent Act* requires that there be utility:

*invention* means any new and useful art, process, machine, manufacture or composition of matter, or any new and *useful* improvement in any art, process, machine, manufacture or composition of matter. [italics added]

[15] In *AstraZeneca Canada Inc v. Apotex Inc*, 2017 SCC 36, at paras 53 to 55 [*AstraZeneca*], the Supreme Court of Canada indicated that “[u]tility will differ based on the subject-matter of the invention as identified by claims construction” and set forth the appropriate approach for determining whether a patent application discloses an invention with sufficient utility under section 2 of the *Patent Act*:

[54] To determine whether a patent discloses an invention with sufficient utility under s. 2, courts should undertake the following analysis. First, courts must identify the subject-matter of the invention as claimed in the patent. Second, courts must ask whether that subject-matter is useful — is it capable of a practical purpose (i.e. an actual result)?

[55] The Act does not prescribe the degree or quantum of usefulness required, or that every potential use be realized — a scintilla of utility will do. A single use related to the nature of the subject-matter is sufficient, and the utility must be established by either demonstration or sound prediction as of the filing date (*AZT*, at para. 56).

[16] Utility as of the filing date in Canada can be established by either demonstration or sound prediction. Utility cannot be supported by evidence or knowledge that only became available after the filing date (see also *Apotex Inc v Wellcome Foundation Ltd*, 2002 SCC 77, at para 56 [*AZT*], cited in the passage above).

[17] Where the utility of an invention must be established by demonstration, the demonstration must occur as of the filing date, but need not necessarily be included in the



description (see *Eli Lilly Canada Inc v Apotex Inc*, 2015 FC 1016, at paras 138 to 142).

Data demonstrating utility as of the filing date may be provided by the Applicant after the filing date by way of an affidavit.

[18] The principle of sound prediction establishes the alleged utility even where that utility has not been fully verified as of the filing date. However, a patent application must provide a “sound teaching” as to how the claimed invention works, as opposed to “mere speculation” (*AZT*, at para 69).

[19] The issue of whether a prediction is sound is a question of fact (*AZT*, at para 71). The assessment of a sound prediction should be based on three components (*AZT*, at para 70):

- There must be a factual basis for the prediction.
- The inventor must have at the date of the patent application an articulable and “sound” line of reasoning from which the desired result can be inferred from the factual basis.
- There must be proper disclosure of the factual basis and the line of reasoning.

[20] These components are assessed from the perspective of the person skilled in the art to whom the patent application is directed, taking into account their CGK. Moreover, with the exception of CGK, the factual basis and line of reasoning must be included in the patent application (see *Bell Helicopter Textron Canada Ltd v Eurocopter SAS*, 2013 FCA 219, at paras 152 and 153).

[21] Although a prediction does not need to be equivalent to a certainty to be sound, the appropriate utility standard is a “*prima facie* reasonable inference” (*Gilead Sciences Inc v Idenix Pharmaceuticals Inc*, 2015 FC 1156, at para 251; *Mylan Pharmaceuticals ULC v Eli Lilly Canada Inc*, 2016 FCA 119, at para 55).

[22] The requirement to demonstrate utility or to ensure that it is the subject of a sound prediction is set out more specifically in section 19.01.02 of the *Manual of Patent Office Practice* [*MOPOP*], revised November 2017 (CIPO).

## Sufficiency

[23] The relevant portions of subsection 27(3) of the *Patent Act* read as follows:

The specification of an invention must:

(a) correctly and fully describe the invention and its operation or use as contemplated by the inventor;

(b) set out clearly the various steps in a process, or the method of constructing, making, compounding or using a machine, manufacture or composition of matter, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it pertains, or with which it is most closely connected, to make, construct, compound or use it;

...

[24] To determine whether the specification complies with paragraphs 27(3)(a) and 27(3)(b) of the *Patent Act*, it is important to answer the following three questions: What is the invention? How does it work? Having only the specification, can the person skilled in the art produce the invention using only the instructions contained in the disclosure? See: *Teva Canada Ltd v Novartis AG*, 2013 FC 141, citing *Teva Canada Ltd v Pfizer Canada Inc*, 2012 SCC 60, and *Consolboard Inc v MacMillan Bloedel (Saskatchewan) Ltd*, [1981] 1 SCR 504, at page 526. In order to answer the third question in the affirmative, the person skilled in the art must not need to be inventive or engage in excessive experimentation: *Aventis Pharma Inc v Apotex Inc*, 2005 FC 1283; *Mobil Oil Corp v Hercules Canada Inc*, [1995] 63 CPR (3d) 473 (FCA); *Merck & Co v Apotex Inc*, [1995] 2 FC 723 (FCA).

[25] Section 14.03 of *MOPOP* revised in October 2019 is also relevant:

Although external documents may be referred to in the description, the invention must be described and enabled by the description alone as interpreted by the person skilled in the art in view of their common general knowledge. Specific prior art knowledge (e.g. information only available in one or a few documents, and which has not been shown to be commonly known and accepted) may be considered not to be “common general knowledge”, and in such cases those specific teachings from the prior art necessary to describe or enable the

invention must be included in the description in order to provide a full and complete disclosure

### *Indefiniteness*

[26] Subsection 27(4) of the *Patent Act* requires that the claims distinctly and explicitly define the subject-matter of the invention:

The specification must end with a claim or claims defining distinctly and in explicit terms the subject-matter of the invention for which an exclusive privilege or property is claimed.

[27] In *Minerals Separation North American Corp v Noranda Mines Ltd*, [1947]

Ex. C.R. 306, at page 352, the Court emphasized the duty of an applicant to make clear in the claims the ambit of the monopoly sought and the requirement that the terms used in the claims be clear and precise:

By his claims the inventor puts fences around the fields of his monopoly and warns the public against trespassing on his property. His fences must be clearly placed in order to give the necessary warning and he must not fence in any property that is not his own. The terms of a claim must be free from avoidable ambiguity or obscurity and must not be flexible; they must be clear and precise so that the public will be able to know not only where it must not trespass but also where it may safely go.

[28] The requirements are set out more specifically in section 16.03 of the *MOPOP*, revised October 2019.

### *Lack of Support*

[29] Section 60 of the *Patent Rules* states: “The claims must be clear and concise and must be fully supported by the description independently of any document referred to in the description.”

## ANALYSIS

[30] In our analysis, we first examine the issue of utility followed by sufficiency, lack of clarity of the claims, and then lack of support.

### *The POSITA and the Relevant CGK*

[31] The examination of utility, sufficiency of the specification and lack of clarity of the claims depends on an understanding of the POSITA and that person's CGK. The relevant date for a review of CGK in terms of utility and sufficiency is the filing date (*AZT and Teva Canada Ltd v Pfizer Canada Inc*, 2012 SCC 60, at para 90).

[32] The examiner cited the following references to demonstrate the CGK:

- D1: Wikipédia, article « intrication quantique », available at the following URL: [http://fr.wikipedia.org/wiki/Intrication quantique](http://fr.wikipedia.org/wiki/Intrication_quantique) (consulted May 3, 2016)
- D3: Harvey J. Motulsky. "Biostatistique - Une approche intuitive". De Boeck University: Brussels. pp. 57-59, 193-207 and 214. 2002.
- D8: Louis Armand *et al.* alpha encyclopedie. Volume 29, "modulation". Franson: Montreal. pp. 4033-4044. 1970.
- D9: D.C. Montgomery *et al.* "Introduction to Time Series Analysis and Forecasting". John Wiley & Sons: Hoboken, New Jersey. pp. 1-67 and 235-239. 2008.
- D10: G.E.P. Box *et al.* "Time Series Analysis", 4th ed. John Wiley & Sons: Hoboken, New Jersey, pp. 1-46 and 71-79. 2008.

[33] In the PR, we also presented the following references related to CGK:

- D11: "No Communication Theorem", Wikipedia, archived on May 4, 2005, at: [https://web.archive.org/web/20050504064143/https://en.wikipedia.org/wiki/No-communication\\_theorem](https://web.archive.org/web/20050504064143/https://en.wikipedia.org/wiki/No-communication_theorem)
- D12: Pirandola *et al.* "Advances in Quantum Teleportation", Nature Photonics 9, pages 641-642, September 29, 2015.

[34] In the PR, we defined the POSITA as a person skilled in the art of quantum communications. That definition was not disputed by the Applicant in the RPR, and we adopt it here.

[35] In the FA (page 4), the examiner listed the POSITA's CGK as follows [TRANSLATION]:

The examiner sees the person skilled in the art of quantum communications as having the following knowledge:

- a) The person is familiar with the concepts of quantum mechanics and the formalities used in quantum communications, such as the Dirac formalism (bra, ket, etc.) or the Schrödinger formalism (wave equation), the representation and treatment of quantum numbers (spin, angular momentum, polarization, energy, etc.) of quantum entities (electrons,, photons, atoms, etc.).
- b) The POSITA is familiar with the measurement devices used to detect quantum entities (e.g. photomultiplier tubes) or to identify some of their quantum numbers (e.g. polarizers), and how to prepare a quantum entity in a given state (e.g. with a defined spin). In particular, the POSITA is familiar with the production of x-rays, e.g. by Bremsstrahlung effect.
- c) The person is familiar with the concepts of thermoluminescence and photoluminescence, processes for preparation (e.g. choice of materials), irradiation and measurement (e.g. heating) that use these properties, and the main applications (e.g. dosimetry) in which they are used.
- d) Finally, the POSITA is familiar with communication concepts and methods (electrical, optical, radio-electric or acoustic), and in particular with the modulation techniques used by them, which are in a wave context (D8).

[36] In the FA (page 3), the examiner summarized the Applicant's submissions as follows [TRANSLATION]:

The applicant provided a few indications of his view of the person skilled in the art:

1. This person knows how to implement "unified" or modulated quantum communications (page 8 of the letter dated February 9, 2016).
2. This person is able to form a language or alphabet for encoding complex messages using different "characteristic profiles" (pages 9 and 10 of the letter dated February 9, 2016).
3. This person can determine what "characteristic profile" is used by applying the correlation calculation method set out in the description (page 10 of the letter dated February 9, 2016).

4. This person is familiar with the methods for calculating the correlation between signals or data (page 10 of the description).
5. This person knows how to stimulate the emptying of thermoluminescent sample traps using a technique adapted to the thermoluminescent material used (page 5 of the description).

[37] The examiner agreed with the Applicant on points 4 and 5, but felt that points 1 to 3 exceeded the competencies of the POSITA.

[38] The Applicant did not dispute the Examiner's list of CGK in the RFA or the RPR. Consistent with the PR, we therefore adopt the CGK listed above, from the FA, while adding points 4 and 5 above from the Applicant.

### *Utility*

[39] We examine utility according to the guidelines set out in *AstraZeneca*, at para 54.

### *What is the subject matter of the invention as claimed?*

[40] Claims 1 through 35 are directed to a process for communications using quantum-entangled samples. Claims 36 to 38 refer to an apparatus for, and use of, the process. Claim 1 is representative in our view [TRANSLATION]:

Process for communicating remotely using the interpretation of thermoluminescence or photoluminescence signals in which at least one group of samples is used with at least one kind of material having thermoluminescence and/or photoluminescence properties, which have links, commonly referred to as "quantum" links, between the trapped entangled electrons of said materials, with said group of samples being commonly referred to as the group of "entangled" samples,

characterized in that:

- at least one "quantum transmitter", comprising at least one "entangled" sample (9, 21, 37, 55, 68, 83, 103, 160, 175) from said group, transmits information, called a "quantum transmission", by means of a thermal de-excitation or photo de-excitation stimulation, applied to said "entangled" sample, during an applied time interval, according to a variation profile of at least one parameter of said stimulation applied

over said time, said profile being commonly referred to as “characteristic profile”, said “entangled” sample being referred to as “entangled” “master” sample,

- at least one “quantum receiver”, comprising at least one “entangled” sample (16, 30, 46, 47, 61, 76, 89, 93, 109, 168, 180) from said group, performs at least one series of luminescence measurements over time with least one optical ray or at least one optical wavelength on said “entangled” sample(s), called “entangled” “slave” samples, one or more of said series of measurements being interpreted by at least one correlation calculation method, in relation to at least one property of said “characteristic profile” used by the “quantum transmitter”, to determine a reception of at least one piece of coded information coded by said “characteristic profile”, said reception being referred to as “quantum reception”.

[41] In our view, the claimed subject-matter that must be useful to comply with section 2 of the *Patent Act* and common to all claims is the process for remote communications using a system of entangled photoluminescent or thermoluminescent samples and a correlated variation of luminescence. The utility of this process is linked to the nature of the subject matter of the set of claims and would render the alleged invention useful within the meaning of section 2 of the *Patent Act*, provided that such utility is established either by demonstration or sound prediction. This view was not disputed by the Applicant in the RPR.

*Had the required utility been established through a demonstration as of the filing date?*

[42] In Annex L1 of the RFA, the Applicant reported with greater detail the experimental results described in the application in relation to Figures 28 to 31. According to that report, the Applicant had applied a moving average of 20 seconds length to reduce the noise in the values measured using the photomultiplier. The Applicant had also adjusted the outlying high values attributed to background radiation. The Applicant hypothesized that, when the timescale was reversed from the moment when the temperature of the master sample reaches its peak, the data measured from the slave sample would show a de-excitation profile similar to that of the master sample. The Applicant developed software to search for the reversal point by testing all possible times to find the maximum correlation. It was therefore not necessary to know *a priori* the reversal point at the

receiver. The Applicant presented the correlation results in Figure 6 in Annex A. A maximum correlation of 0.6 was found at the reversal point.

[43] In our view, this interpretation of the result as a demonstration of a perceptible signal and indicating the successful use of an entangled photoluminescent or thermoluminescent sample system in a method of communication does not take into account that the data was pre-filtered through the application of a moving average of 20 seconds duration. Each filtered datum is, to some extent, inherently correlated with neighbouring data. In other words, the data gathered are not independent observations (see D3, page 197). It follows that filtered data within a few tens of seconds of each other will show correlation, even if the filter input data is random noise. In addition, the experiment lacked a control in which a slave sample was analyzed without heating the corresponding master sample.

[44] In the RPR, the Applicant provided an adjusted value of 0.51 for the maximum correlation. The Applicant stated that this adjusted value took into account the sliding average. In our view, the method used to adjust the value assumes that the correlation is uniformly distributed over the relevant period.

[45] In our view, the POSITA would not be satisfied that this experiment demonstrated the required utility. Consequently, we find that the utility of the claimed subject-matter was not established through a demonstration as of the filing date.

*Was the required utility established by a sound prediction as of the filing date?*

[46] As noted in the “Legal Principles” section, the factual basis, reasoning and disclosure are considerations in determining whether a prediction is sound. These elements are assessed from the perspective of the POSITA, taking into account the relevant CGK, and based on what the POSITA would consider to be clear and sound reasoning that would infer the required utility of the invention from the factual basis.



i. Factual basis

[47] The description on pages 1 to 3 discloses the conventional physical basis of excitation and the stimulated emission of thermoluminescent and photoluminescent crystals, without quantum entanglement.

[48] The description also discloses that quantum entanglement is preserved even when the entangled particles are separated by any distance.

ii. Reasoning

[49] A sound prediction of utility requires clear and sound reasoning to infer the desired outcome from the factual basis. The description states at pages 4 to 6 that when simulation of an electron in the master sample causes it to emit visible photons by de-excitation, the corresponding entangled electron in the unstimulated slave sample undergoes correlated de-excitation, causing the emission of photons in the slave sample.

[50] In the RFA, in Annex L3 on pages 3 to 6, the Applicant explained the principles behind how electrons with quantum-entangled spins behave with respect to energy bands of energy in the doped crystals. The Applicant stated that the reason the slave sample emits a photon without stimulation is that, once the entangled electron in the master sample is stimulated to emit a photon, it takes on a defined spin. This would cause the entangled electron in the slave sample to take on an opposite spin, making it incompatible with its orbital in the crystal trap.

iii. Disclosure of the factual basis, reasoning

[51] To establish a sound prediction of utility, the factual basis and reasoning behind it, unless they are part of the CGK at the filing date, must be disclosed in the specification as filed. The description must be clear enough to allow the POSITA to understand the basis for the prediction and to be able to soundly predict that the claimed invention would work in its full scope once it is presented in a practical form.

[52] The only factual basis in the description of the reasoning above is the statement on page 3 of the description that, according to a principle of quantum mechanics, the entanglement is preserved when the two entangled samples are separated.

[53] The other explanations of the factual basis and reasoning by the Applicant in the RFA, as outlined above, cannot be considered as a disclosure for the purpose of sound prediction, as these explanations are not included in the specification originally filed and do not appear to be CGK.

*Analysis of predicted utility*

[54] As noted above, in our view, the factual basis disclosed in the specification is limited to the conventional physical basis of excitation and stimulated emission of thermoluminescent or photoluminescent crystals, as well as the generally known principles of quantum entanglement. With respect to the line of reasoning, in our view, based on the CGK as of the filing date, the POSITA would consider that the stimulation of photoluminescence or thermoluminescence in the master sample leads to the destruction of the entanglement of its electrons with respect to their counterparts in the slave sample, such that the photoluminescence or thermoluminescence of the master sample would not cause any observable changes in the slave sample. In the absence of any factual basis and reasoning to support the contrary, the POSITA would maintain his or her position in this regard. In addition, in our view, the POSITA would consider that this transfer of information about the state of the master sample (stimulated or not) to the slave sample constitutes a violation of the no-communication theorem of quantum information (D11), which was generally known and accepted by the majority of those who practice the art in question as of the filing date (see *Eli Lilly*). In other words, the POSITA would not consider the reasoning valid.

[55] These considerations are at the core of our assessment that the theory disclosed and the corresponding reasoning are inconsistent with the generally accepted laws of quantum physics and mechanics, and that the POSITA would not have made a sound prediction, based on the CGK at the filing date following the defined factual basis and line of

reasoning, that the entangled photoluminescent or thermoluminescent sample system described can be used for remote communications.

[56] In the RPR, the Applicant stated that the panel erred in law in applying the filing date for the theoretical basis of utility. We note, however, that jurisprudence supports that date. We note that an applicant may provide an argument dealing with theoretical principles after having received a report, but the underlying theoretical principles must have been well-known as of the filing date if they are not included in the specification.

[57] Consequently, in our view, the utility of the claimed subject-matter has not been established by sound prediction as of the filing date.

[58] The FA, at pages 7 to 12, identified a lack of utility due to the correlation method described. In our view, correlation methods do not inherently lack utility; however, pre-filtering data using a 20-second moving average means that correlations found with offsets of less than a few tens of seconds cannot be interpreted as significant for the successful use of a photoluminescent or thermoluminescent entangled sample system in a communication method.

#### *Conclusion concerning utility*

[59] In our view, the Applicant has not established the utility of the subject matter of claims 1 through 38 as of the filing date, either by demonstration or sound prediction. We therefore conclude that the subject matter of the claims on file lacks utility and does not comply with section 2 of the *Patent Act*.

#### *Sufficiency of the specification*

[60] In light of the legal principles outlined above, we consider whether the specification is defective on the basis that it does not provide the POSITA with clear, concise and complete information to allow the realization of the invention as claimed using only the instructions contained in the disclosure, without ingenuity or having to engage in excessive experimentation.

- [61] The FA (bottom of page 4) states that the description is insufficient. No instructions are provided to the POSITA on how to produce entangled trapped electrons, in samples of photoluminescent or thermoluminescent materials. The question of sufficiency is whether the description provides sufficient instructions to the POSITA on how to use entangled photon beams to reliably produce samples of photoluminescent or thermoluminescent crystals that contain trapped entangled electrons in sufficient concentrations to be used for communication purposes.
- [62] On page 4, the description refers to international patent application WO 2005/117306 to explain the production of trapped electrons. We first note that a document may not be incorporated by reference in an application (see *MOPOP* 14.07.04, revised October 2019). The description therefore lacks information on how to create the entangled samples.
- [63] In addition, even if the description had contained the steps set out by WO 2005/117306, in our view the description would still lack information. The POSITA would not consider these descriptions to be sufficient instructions to reliably generate samples of photoluminescent or thermoluminescent crystals that contain trapped entangled electrons in sufficient concentrations to be used for communication purposes.
- [64] We note that D12 describes the state of the art in 2015, well after the filing date of March 26, 2007. D12 describes recent progress in implementing quantum entanglement in solid state systems, all references to such progress from articles published after the filing date. The state of the art tends to indicate that the creation of trapped entangled electrons in solid-state samples was not CGK at the filing date.
- [65] In the RPR, the Applicant argued that the specification provides a sound teaching as to the preparation of entangled samples and that a person skilled in the art of quantum communications who had overcome his prejudices regarding the effectiveness of the technique could put the invention into practice.

[66] In our view, sufficiency is not a question of prejudice. We note that the POSITA is considered to possess the CGK in the art at the time of filing and a mind willing to understand the specification, but lacking inventiveness. In our view, and for the reasons outlined above, the teaching in the specification regarding the preparation of entangled samples would not lead such a person to produce functional entangled samples without inventiveness or the need to engage in excessive experimentation.

[67] The FA (page 5) also considered the description to be insufficient, as it refers to the concept of modulation. In our view, this is not a question of insufficiency, as no claim refers to “modulation”. To be sufficient, it is enough for the specification to contain a teaching of the invention as claimed (see *Lundbeck Canada Inc v Canada (Health)*, 2009 FC 146, para 135).

[68] Finally, the FA (page 6) also considered the description to be insufficient in that it refers to the concept of binary coding of signals “0” and “1”. In our view, knowledge of this coding is CGK. It is well-known in the art to transmit a “0” as the absence of a signal.

[69] Consequently, in our view, the specification does not comply with subsection 27(3) of the *Patent Act*, as it does not allow the POSITA to implement the invention as claimed, without ingenuity or having to engage in excessive experimentation.

#### *Indefiniteness of the claims*

[70] The FA indicated that some claims are unclear.

[71] The FA mentioned a lack of antecedents in claims 1 and 5 to 9:

“group of entangled samples” (claim 1, line 8);  
“temperature parameter” (claim 5);  
“luminous intensity parameter” (claim 6);  
“incident wavelength” (claim 7);  
“surface area stimulated” (claim 8); and  
“volume stimulated” (claim 9).

[72] We find that these claims are not defective in this regard. We find that the antecedents are implied in context.

[73] The FA also indicated that claim 1 lacks clarity due to the use of the term “and/or”. While this term may sometimes cause ambiguity, in our view, it does not introduce any ambiguity in this context. Therefore, in our view, the claim is not defective in this regard.

[74] The FA indicated that claim 1 lacks clarity because it cannot be accurately established whether the “said entangled sample(s)” element refers to the “entangled sample” element of the quantum transmitter equipment or “entangled sample” of the quantum receiver equipment. We agree with the FA in this regard.

[75] The FA indicated that claim 30 is indefinite. The use of the subjective expression “more particularly” appears to direct the claim simultaneously to both broad and narrow embodiments. We agree with the FA in this regard.

[76] Finally, the FA indicated that claim 35 is indefinite because of the term “dark count”. In our view this term is clear.

[77] Consequently, in our view, claims 1 and 30 are unclear and do not comply with subsection 27(4) of the *Patent Act*.

#### *Lack of Support*

[78] The FA indicated that claims 31 and 32 do not comply with section 84 of the *former Patent Rules*. The meaning of the expression “instant of activation” is not present in the description. We agree with the FA.

#### **PROPOSED CLAIM SET-2**

[79] In the RPR, the Applicant proposed to amend the claims to correct some defects.

[80] In our view, these amendments would correct the aforementioned indefiniteness and lack of support defects, but would not correct the remaining major defects related to utility and insufficiency, for the same reasons as those noted above with respect to the claims on file.

**CONCLUSIONS AND RECOMMENDATIONS OF THE BOARD**

[81] We recommend that the Commissioner of Patents refuse the application, as the subject matter of the claims on file lacks utility and does not comply with section 2 of the *Patent Act*, and the specification does not comply with subsection 27(3) of the *Patent Act*.

[82] In addition, in our view, claims 1 and 30 are unclear and do not comply with subsection 27(4) of the *Patent Act*, and claims 31 and 32 do not comply with section 60 of the *Patent Rules*.

[83] Proposed claim set-2 does not remedy all of the defects and the Panel therefore declines to recommend the introduction of these claims, as they do not constitute a “necessary” amendment under subsection 199(5) of the *Patent Rules*.

Howard Sandler  
Member

Marcel Brisebois  
Member

Paul Fitzner  
Member



**DECISION OF THE COMMISSIONER**

[84] I concur with the conclusions of the Board and its recommendation to refuse the application, as the subject matter of the claims on file lacks utility and does not comply with section 2 of the *Patent Act*, and as the specification does not comply with subsection 27(3) of the *Patent Act*. In addition, claims 1 and 30 are unclear and do not comply with subsection 27(4) of the *Patent Act*, and claims 31 and 32 do not comply with section 60 of the *Patent Rules*.

[85] Accordingly, pursuant to section 40 of the *Patent Act*, I refuse this application. In accordance with the provisions of section 41 of the *Patent Act*, the Applicant has six months to appeal my decision to the Federal Court of Canada.

Johanne Bélisle  
Commissioner of Patents

Dated at Gatineau, Quebec

This 6<sup>th</sup> day of January 2020