Commissioner=s Decision #1303

Décision de la Commissaire #1303

TOPIC: B00, B20, B22, G00

SUJET: B00, B20, B22, G00

Application No. : 592,567

Demande no. : 592,567

COMMISSIONER=S DECISION SUMMARY

C.D. 1303, Application No. 592,567

The subject application was rejected by the Examiner under section 2 of the *Patent Act* for containing claims for which the utility could not be soundly predicted and under subsection 34(2) of the *Patent Act* for containing claims directed to a desired result.

The Commissioner of Patents agreed with the recommendations of the Board that the application be allowed provided a specified amendment is made and pending review of potential conflicts under section 43 of the *Patent Act*, as it read immediately before October 1, 1989.

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

The rejection of patent application number 592,567 under subsection 30(3) of the *Patent Rules* was reviewed. The rejection has been considered by the Patent Appeal Board and by the Commissioner of Patents. The findings of the Board and the Decision of the Commissioner are as follows:

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INTRODUCTION

1. This Decision deals with a review by the Commissioner of Patents of the Examiner=s Final Action dated June 19, 2006, on application 592,567, filed on March 2, 1989 and entitled, SUPERCONDUCTIVITY IN AN OXIDE COMPOUND SYSTEM WITHOUT RARE EARTH. The inventor is Ching-Wu Chu and the current owner is the UNIVERSITY OF HOUSTON.

OVERVIEW OF THE TECHNOLOGY

2. The invention relates to multiphase metal oxide compositions which are capable of superconductivity at a temperature of 77 K or higher. This allows the loss of electrical resistance to be achieved by cooling with liquid nitrogen, rather than the more costly liquid helium, and is the reason for referring to them as >high-temperature= superconductors. The materials are ceramics and are predominately of the so-called BCSCO type (Bismuth Calcium Strontium Copper Oxide). As will be discussed in some detail, the superconductive oxides taught in this application can be represented by the nominal formula $M^*_aA^*_bO_y$ (defined below). Similar materials but comprising a rare earth element had previously been known but the present invention sought to avoid the higher cost of making materials containing them.

3. The field of high temperature superconductors is complex and specialised. Generally speaking, a superconductor is a material for which a critical temperature (T_c) exists at which it becomes superconductive, exhibiting zero electrical resistance and expelling its interior magnetic field (the Meissner effect). For the purposes of this Decision, it is the zero electrical resistance that is the focus for characterising the materials as superconductors, as this is the phenomenon which is most relevant to the claims, and what is taught throughout the disclosure. Therefore, for our purposes, the terms >superconductor=, >critical temperature=, >T_c= and >zero electrical resistance= are used essentially interchangeably in the sense that they all refer to or denote the absence of electrical resistance in the materials when cooled below the given temperature.

4. A further note needs to be made of what are being referred to as >nominal formulae= (empirical formulae) and >nominal compositions=, the formulae being used to represent the compositions in the usual manner. It must be recognised that, in this case, nominal formulae represent nominal compositions that are themselves a generalisation of entire multiphasic solids. A >phase= is a region within a material that is uniform in chemical composition and physical state, making separate phases differ from one another chemically and/or physically. The present compositions therefore do not necessarily comprise a single pure species, but typically comprise more than one of these phases. Nominal formulae therefore represent an average, of sorts, over the entire composition, including those phases that do not contribute to the superconductivity. Indeed, not all phases need be superconductive provided the material as a whole is.

5. The nominal formulae can also be simplifications of potentially more precise formulae, used because the formula that best represents a given material may involve fractions of atoms, making it cumbersome and awkward to refer to. These formulae are intended to give the simplest possible formula representing the composition of the material. It will also be seen that each of M* and A* are not single species, but may represent a mixture of divalent alkaline earth metals selected from the group consisting of Ba, Sr and Ca, and a mixture of Cu and a trivalent metal selected from the group consisting of Bi and Tl, respectively. At the risk of getting ahead of ourselves, but to put the above concept into better perspective, an example from the disclosure, identified as >BCSCO-c=, can be considered. This example will be further discussed later in this Decision.

6. BCSCO-c represents a nominal composition comprising a 1:1:1:3 ratio of Bi:Ca:Sr:Cu (see para. 59). Rearrangement and appropriate grouping of the atoms into the $M^*_aA^*_bO_y$ format, gives: $CaSrBiCu_3O_y$, because M* comprises the Ca and Sr, and A* the Bi and Cu. Since M* represents a mixture of the two elements, Ca and Sr, the subscript >a= is derived by totalling the number of atoms and letting the interior of the parentheses reflect their proportions. In this case, there are two atoms in M*, so a = 2 and M^*_a is $(Ca_{0.5}Sr_{0.5})_2$ since half the atoms are calcium, while the others are strontium. Similarly, A^*_b works out to be: $(Bi_{0.25}Cu_{0.75})_4$ with b = 4. For simplicity and consistency amongst the claims >b= is set to 1. In order to do so, the subscripts are divided by 4 to get: $(Ca_{0.5}Sr_{0.5})_{0.5}(Bi_{0.25}Cu_{0.75})_1O_{y/4}$ (the proportions of the elements in the parentheses are not affected). This shows that the $M^*_aA^*_bO_y$ format is a simplification of something which is itself a simplification of a complex, multiphase solid.

7. As an additional example of the simplification these nominal formulae are, the superconducting phase shown as being 2:1:2:2 (Bi:Ca:Sr:Cu, see Table 2) is taught in the disclosure to be more precisely written as $Bi_2(Sr_{0.56}Ca_{0.39}Bi_{0.05})_3Cu_2O_{8+\delta}$ with Aconsiderable variability of composition [being] observed from grain to grain@ (page 19 of the disclosure).

PROSECUTION HISTORY

8. The present application was filed on March 2, 1989 under the provisions of the *Patent Act* as it read immediately before October 1, 1989 (henceforth: the *Patent Act*). A total of five Office Actions were issued during prosecution, the first being in December 1992, and culminating in the Final Action dated June 19, 2006.

9. In the Office Action of February 22, 2005, an objection under subsection 34(2) of the *Patent Act* was first raised, it being subsequently reasserted and then appearing in the Final Action. The objection under section 2 of the *Patent Act* was initially raised in an Office Action dated September 26, 2005 (the >pre-Final Action=) and was reapplied in the Final Action. These are the

two objections that are to be considered in this Decision, since the response to the Final Action (dated December 14, 2006) was deemed by the Examiner to be insufficient to completely overcome them. The amendment submitted with the response resulted in the 14 claims on file being substituted with the 23 claims that are presently at issue. Following the Final Action, the case was forwarded to the Board along with a>Brief to the Patent Appeal Board= (>Brief=) and a >Supplemental Brief to the Patent Appeal Board= (>Supplemental Brief=), the latter being provided by the Examiner at the request of the Board following a query from the Applicant about the status of certain claims. A copy of the Brief and Supplemental Brief was also sent to the Applicant. No written submissions subsequent to the response to the Final Action were received, however, and an invitation for a hearing was declined.

OVERVIEW OF THE GROUNDS FOR REJECTION

10. Broadly stated, the allegations made by the Examiner are as follows:

    11. Utility cannot be soundly predicted across the entire scope of the claims, contrary to section 2 of the *Patent Act*; and

    12. Claims are defined in terms of the desired result, contrary to subsection 34(2) of the *Patent Act*.

[1] In the Final Action, the Examiner indicated that the lack of sound prediction objection is being levelled at claims 1, 3, 4 and 13; in the Supplemental Brief, the same defect was identified in claims 1, 3, 4, 5, 7, 8, 10, 13, 15, 17, 21 and 22, at least in part in light of amendments made in response to the Final Action. Similarly, the subsection 34(2) objection was directed at claims 1, 3, 4 and 13 in the Final Action and, in the Supplemental Brief, the Examiner found claims 1B13 and 15B21 defective. The Board reviewed the Supplemental Brief and considered it appropriate to review the claims identified therein for compliance with section 2 and subsection 34(2) of the *Patent Act*.

CLAIMS AT ISSUE

[2] For convenience, the independent claims are reproduced below. Claim 1 reads:

> 1. A material which is superconductive at a temperature of 77EK or higher, said material comprising a multiphase oxide of nominal composition $M^*_aA^*_bO_y$ wherein M* is a mixture of divalent alkaline earth metals selected from the group consisting of Ba, Sr, and Ca wherein the ratio of the alkaline earth metal of larger atomic radius to the alkaline earth metal of smaller atomic radius is from about 1:1 to about 3:1; A* is a mixture of Cu and a trivalent metal selected from the group consisting of Bi and Tl wherein the molar ratio of Cu to said trivalent metal is from about 1:1 to about 3:1; Aa@ is 1 to 2; Ab@ is 1; and Ay@ is 2 to 4.

[3] Independent claim 15 is identical except that it excludes thallium from being an option for the trivalent metal. Claims 1 and 15 therefore are directed to a multiphase material which is superconductive at or above 77 K and which can be represented by the nominal formula $M^*_aA^*_bO_y$, where a = 1B2; b = 1 and y = 2B4 .

[4] Claim 3 is somewhat narrower in scope:

> 3. A material which is superconductive at a temperature of 77EK or higher, up to about 90EK, said material comprising a multiphase oxide of nominal composition $BiCaSrCuO_{2y}$ wherein Ay@ is 2 to 4 and having a sufficient quantity of a crystalline phase composition of a formula $Bi_2CaSr_2Cu_2O_g$ wherein Ag@ is a value from about 8 to about 9 which provides said crystalline phase composition with zero electrical resistance at a temperature of 77EK or higher, up to about 90EK, to cause the material to exhibit zero electrical resistance at a temperature of 77EK or higher, up to about 90EK.

[5] This $Bi_2CaSr_2Cu_2O_g$ phase is the one which is responsible for the superconductive properties of the materials, according to pages 9B10 of the disclosure (more on this, below). The claim specifies that there must be enough of the $Bi_2CaSr_2Cu_2O_g$ phase to make the composition become superconductive at from 77 K to about 90 K. If the nominal formula of the material and the specific phase are, for consistency, recast in the form used in claims 1 and 15 (i.e., the $>M^*_aA^*_bO_y$ form=, see para. 6) , and >b= is set to 1 accordingly, then a =1 (for $BiCaSrCuO_{2y}$) or 0.75 (for $Bi_2CaSr_2Cu_2O_g$), and y = 8B9.

[6] Claims 4, 13, 17 and 22 define oxide materials via a different formula from that used in claims 1 and 15. Claims 4 and 17 are directed to a superconducting oxide composition, as are claims 13 and 22, these latter when made by a defined process. The difference between claims 4 and 17 and 13 and 22 is the same as the difference between claims 1 and 15; i.e., the former claim of each pair allows for Bi and Tl, while the latter only allows for Bi. Claims 4 and 13 are reproduced below:

> 4. An oxide composition of nominal formula $T_dM^*_eCu_fO_g$ wherein AT@ is Bi or Tl; AM*@ is a mixture of alkaline earth metals selected from the group consisting of Ba, Sr, and Ca wherein the ratio of the alkaline earth metal of larger atomic radius to the alkaline earth metal of smaller atomic radius is from about 1 to about 3; Ad@ is a number from about 1 to about 3; Ae@ is a number from about 1 to about 6; Af@ is a number from about 1 to about 6; and Ag@ is a number from about 0.5(3d + 2e + 2f) to about 0.5(3d + 2e +3f) that provides the oxide composition with zero electrical resistance at a temperature of 77EK or higher.
>
> 13. A superconducting oxide composition of nominal formula $T_dM^*_eCu_fO_g$ wherein AT@ is Bi or Tl; AM*@ is a mixture of alkaline earth metals selected from the group consisting of Ba, Sr, and Ca wherein the ratio of the alkaline earth metal of larger atomic radius (M^L) to the alkaline earth metal of smaller atomic radius (M^S) is from about 1 to about 3; Ad@ is a number from about 1 to about 3; Ae@ is a number from about 1 to about 6; Af@ is a number from about 1 to about 6; and Ag@ is a number from about 0.5(3d + 2e + 2f) to about 0.5(3d + 2e +3f) that provides the oxide composition with zero electrical resistance at a temperature of 77EK or higher, wherein said composition is made by a process comprising the steps of:
>
> compressing a mixture of solid powdered compounds comprising:
>
> (a) T_2O_3
> (b) M^LCO_3 or M^LO
> (c) M^SCO_3 or M^SO and
> (d) CuO
>
> in proportions appropriate to yield said formula;

heating the compressed powder mixture to a temperature of from about 800EC to about 950EC for a time sufficient to complete the solid state reaction; and

quenching said reacted compressed mixture to room temperature.

[7] For ease of comparison, the nominal composition in claims 4, 13, 17 and 22 can also be recast in the same format as used in claims 1 and 15. In the $M^*_aA^*_bO_y$ form, A* denotes the combination of the trivalent metal and copper, so it is the equivalent of combining >T= and >Cu= (in $T_dM^*_eCu_fO_g$) and since M* is the same in both formats, the >e= subscript is equivalent to >a=. Similarly, >g= is equivalent to >y= and >b= is the sum of subscripts >d= and >f=. Therefore, adapting the $M^*_aA^*_bO_y$ format to the nominal compositions of claims 4, 13, 17 and 22 (and setting b = 1), to be consistent with claims 1 and 15, the values of the other subscripts are: a = 0.11B3, and y = 3.5B22.5.

[8] These claims are therefore similar to claims 1 and 15 except that the number of elements in the nominal compositions is somewhat broader, and claims 13 and 22 are subject to a process limitation.

[9] Finally, independent claim 11 reads:

11. A crystalline phase composition comprising cations of Bi, Ca, Sr, and Cu approximating the ratio of 2:1:2:2 for Bi:Ca:Sr:Cu and which exhibits zero electrical resistance at a temperature of 77EK or higher.

[10] The composition defined in claim 11 is not restricted to being an oxide; this is not something provided for by the disclosure, as will be discussed later. Again, for comparative purposes, the composition can be recast in the $M^*_aA^*_bO_y$ format. In this case, setting b = 1 gives a = 0.75.

THE FIRST OBJECTION: SOUND PREDICTION

[11] The first question to be addressed by the Board is whether or not the subject-matter of claims 1, 3, 4, 5, 7, 8, 10, 13, 15, 17, 21 and 22 can be soundly predicted to have the promised utilityCviz. zero electrical resistance at a temperature of 77 K or higherCcontrary to section 2 of the *Patent Act*.

THE EXAMINER=S POSITION

[12] The objection as it appeared in the Final Action is reproduced, in part, below:

Claims 1, 3, 4, and 13 do not comply with Section 2 of the *PATENT ACT* in effect just before 1 October 1989. The description fails to demonstrate the alleged utility of all the claimed subject matter in that

> there is no factual basis presented supporting the utility nor is there a sound line of reasoning as to why all the claimed materials should have the predicted alleged utility. (Apotex Inc. V. Wellcome Foundation (2002) 2 S.C.R. 77 or 21 C.P.R. (4th) 499).
>
> These claims define a material which is superconductive at a temperature of 771K or higher.
>
> In Figure 2, there is a factual basis for claiming superconductivity at about 771K for BCSCO-a ($Bi_1Ca_1Sr_1Cu_3O_?$) and at about 831K for BCSCO-b ($Bi_1Ca_1Sr_1Cu_2O_?$). BCSCO-c ($Bi_1Ca_1Sr_1Cu_3O_?$) shows a T_c of about 351K.
> The description, however, fails to provide a sound line of reasoning as to why materials other than those mentioned immediately above should have the predicted alleged utility. . . .
> There is also no factual basis presented in the description for believing that other amounts of the elements in the material will produce the desired superconductivity, nor is there any discussion of why they should do so.
>
> Merely stating that other values for the amounts of the elements in the compound or other elements substituted in the compound for the ones mentioned above will work is not sufficient to establish a sound line of reasoning.

[13] As mentioned earlier, based on the Supplemental Brief, the Board will assess claims 1, 3, 4, 5, 7, 8, 10, 13, 15, 17, 21 and 22 for compliance with section 2 of the *Patent Act*. It should be noted that there is a typographical error in the above quotation that may introduce a seeming inconsistency in our analysis if not mentioned at the outset: in the third paragraph, the Examiner indicates that it is BCSCO-c that has the T_c of 35 K, but it is actually BCSCO-b that shows this T_c. This is reflected in the Brief where the example with a = 0.66 (i.e. BCSCO-b, see Table 2 and para. 26) was the one referred to.

[14] The crux of the Examiner=s position therefore relates to the number of atoms recited in the nominal formulae (values of the subscripts), and whether the degree of variability claimed can be soundly predicted to result in a material that is superconductive at or above 77 K. The Brief, more specifically points to the subscript relating to the proportion of divalent alkaline earth metals (a mixture which can include Ba, Sr and Ca). Therein the Examiner states:

> Because there is no line of reasoning in the description as to why a value of Aa@ more than 1.0, specifically 2.0, should be expected to be useful, the Applicant seems to be relying on knowledge and expectations well-known to a chemist to make this prediction. . . .
>
> There is no reason to expect that a = 2 will give the desired results, and the claim therefore includes compositions which have not been shown to have the desired results.

[15] Since the subscript >a= does not appear in all of the claims identified in the Supplemental Brief (i.e., there is no >a= in the $T_dM^*_eCu_fO_g$ format), we have applied this reasoning to these claims after having recast them in the $M^*_aA^*_bO_y$, format with b = 1 (see paras. 16B18) . Although the ultimate question of sound prediction is not limited to the value of >a=, it is the one that is the focus of the Examiner, and thus it is appropriate to direct our analysis accordingly. We also note

that claims 4, 13, 17 and 22 each have values for >a= ranging up to 3. These claims were identified as defective, but the above passage from the Brief focuses only on values of >a= up to 2. This appears to have been a simple oversight, and we are taking the Examiner to have meant all values of >a= greater than 1 (*cf*. from the Brief ABecause there is no line of reasoning in the description as to why a value of Aa@ more than 1.0 . . . should be expected to be useful . . .@).

[16] The Examiner also points out in the Brief that there is direct evidence of inutility:

> The Applicant has argued in his letter of 14 December 2006 page 4 that there must be evidence that a prediction is not sound must be presented [*sic*] before the prediction can be discounted. The evidence here is provided by the Applicant in Figure 2 of the Application, where the composition with a = 0.66 gives a Critical Temperature of 35EK, which is below the desired result of 77EK. This value of Aa@ is below that which is claimed, but it does demonstrate that prediction based on the data presented is unsound.

[17] Although the Examiner states that a = 0.66 is below what is being claimed, they are in fact within the scope of claims 4, 13, 17 and 22. The implication from the above passage then is that this is direct evidence that one of the examples relied upon for the factual basis actually lacks utility, which casts doubt on the soundness of the prediction. Moreover, in light of the fact that a = 0.66 is within the scope of claims 4, 13, 17 and 22, these claims should consequently be found to encompass embodiments lacking utility. As we will discuss later, this is not the case, because the same example was shown to be capable of being made to work.

[18] What we need to determine then is whether the compositions defined in these claims could be soundly predicted to have the promised utility; *viz*. to be superconductive at a temperature of 77 K or higher. This determination is based on the disclosure, the state of the art and the common general knowledge available to a person skilled in the art.

THE APPLICANT=S ARGUMENTS

[19] In response to the sound prediction objection raised by the Examiner the Applicant has argued, in response to the Final Action and/or pre-Final Action, that:

1) The Applicant is not required to test and prove its invention in all its claimed applications, relying upon the ruling in *Monsanto v. The Commissioner of Patents* [1979] 2 S.C.R. 1108 (*Monsanto*).

2) The specification provides support that other subscript values or >amounts= of the elements in the nominal formulae will work, suggesting that the prior art supports the specified ranges.

3) The sound prediction requirements elucidated in *Apotex Inc. v. Wellcome Foundation* (2002) 2 S.C.R. 77 or 21 C.P.R. (4th) 499 (*Wellcome*) cannot be applied to the present

situation, distinguishing the present case by the fact that that judgment dealt with a new use of an old compound, whereas the present claims pertain to novel compositions. The standard for utility is alleged to differ, it being higher in the case of a new use of an old compound.

4) In order for a lack of utility objection to be sustainable, there must be evidence of a lack of utility or the prediction must be shown to not be sound, yet there is no evidence to suggest either.

AUTHORITY FOR THE OBJECTION

[20] Questioning the soundness of a prediction, as mentioned, falls under the purview of section 2 of the *Patent Act* which includes the requirement that what is invented be found to be useful. Section 2 gives the definition of >invention=:

> Ainvention@ 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;

[21] The statutory requirement is explicit on the utility requirement (i.e. Auseful@), but requires further clarification on what exactly this means, and how the standard is to be applied to sound prediction. This has evolved through the jurisprudence.

[22] The Supreme Court introduced in *Wellcome* a now oft-cited tripartite test for determining whether a prediction is >sound=. The three elements of the test are:

1. There must be a factual basis for the prediction;

2. 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; and

3. There must be proper disclosure.

[23] The concept that untested embodiments may be patentable existed in earlier case law (see, for example, *Monsanto* and *Olin Mathieson Corporation v. Biorex Laboratories Ltd.,* [1968] S.C.R. 950), but there was no articulated test for assessing the soundness of a prediction until *Wellcome*.

[24] The relevant date for a sound prediction determination is the filing date (see: *Aventis Pharma Inc. v. Apotex Inc.*, 2005 FC 1283, 43 C.P.R. (4th) 161 at para.164; aff=d on this point 2006 FCA 64, 46 C.P.R. (4th) 401 at para. 30). That is, as of the filing date, a person skilled in the

art must have been able to soundly predict the utility of the claimed subject-matter.

[25] At the outset it should be noted that the fact that the claims rely on a prediction is not in dispute. Once the claims extend beyond that for which utility has been demonstrated, the Applicant must be relying on a sound prediction to support their claims (see *Eli Lilly Canada Inc. v. Apotex Inc.* 2009 FCA 97, aff=g 2008 FC 142, 63 C.P.R. (4th) 406, at para.18 (*Eli Lilly*)). What logically follows is that predictions are only predictions where not all the claimed embodiments have been demonstrated to work, and there is clear indication that claiming predictions is permitted provided they are sound. But even when sound, Aa prediction does not need to amount to a certainty@, as we are reminded in the recent judgment, *Lundbeck Canada Inc. v. Ratiopharm*, 2009 FC 1102. We can therefore agree with the Applicant=s argument that there is no requirement for testing and proving the invention in all its claimed applications. There are, however, the requirements of the *Wellcome* test that must be met for the prediction to be considered sound.

[26] What we will do before continuing with the analysis according to the test is first establish whether a lack of sound prediction objection is appropriate when, as in the present application, the compound is new. If the Applicant is correct that the doctrine does not apply to new compounds, or that the standard is much higher for the new use of an old compound compared to a new compound, and therefore distinguishable from *Wellcome* on that ground, then there may not be any need for further analysis along this avenue.

APPLICABILITY OF THE DOCTRINE OF SOUND PREDICTION TO NEW COMPOUNDS

[27] The Applicant is of the opinion that the tripartite test set forth in *Wellcome* (i.e. >the doctrine of sound prediction=) sets the standard Aquite high@, arguing that while this is reasonable where the invention lies in a new use for an old compound, the test is too stringent for new compounds.

[28] While it is acknowledged that the facts of *Wellcome* certainly do differ from those of the present situation, it is settled law that the doctrine does in fact also apply to new compounds. For example, in *Pfizer Canada Inc. v. Apotex Inc.*, 2007 FC 26, 59 C.P.R. (4th) 183 (*Pfizer*) at paragraph 36, O=Reilly J. specifically addressed this point in reference to *Wellcome*:

> While the patent there related to a new use (treatment of HIV/AIDS) for an old chemical compound (AZT), there is nothing in the judgment that leads me to conclude that the principles set out in it do not apply equally to new compounds.

[29] This particular point was even further clarified when the case was brought to the Federal Court of Appeal (*Pfizer Canada Inc. v. Apotex Inc.*, 2007 FCA 195, 60 C.P.R. (4th) 177), as stated at paragraph 3 of that judgment:

> The second issue is whether the doctrine of sound prediction applies at all to a claim for a new compound. In our view, it does. This point was most clearly addressed by Justice Binnie in *Apotex Inc. v. Wellcome Foundation Ltd*, [2002] 4 S.C.R. 153 (S.C.C.), in particular at paragraphs 46 and 80.

[30] Therefore, the doctrine of sound prediction is appropriately applied to the utility of new compounds as well as old and, as for the suggestion that the bar is set higher for new uses of old compounds, this argument of the Applicant=s was not substantiated by any jurisprudence, nor could we find any to support such a double standard. In contrast, these two decisions intimate that the same standard applies to new and old compounds equally.

[31] In sum, because the claims extend beyond what was demonstrated to be useful, the utility of the claims must necessarily be relying upon a sound prediction. The concept of sound prediction is clearly not limited to claims to a new use of an old compound, and there is no evident difference in the standard to be applied in the evaluation.

EVIDENCE OF INUTILITY OR THAT THE PREDICTION IS NOT SOUND

[32] The Applicant noted that for the claims to be rejected for lacking utility, there either needs to be evidence of a lack of utility, or there must be evidence presented that shows that the prediction relied upon was not sound (see para. 29). This position was supported by a quotation from *Monsanto* (at paras. 24B25) [original emphasis]:

> In the instant case, the Board, in spite of a complete absence of any evidence of unsoundness of the prediction, deny the claims and would in the end limit them to the area of *proved utility* instead of allowing them to the extent of *predicted utility*. In my view this is contrary to s. 42 of the *Patent Act*.
>
> . . . If the inventors have claimed more than what they have invented and included substances which are devoid of utility, their claims will be open to attack. But in order to succeed, such attack will have to be supported by evidence of lack of utility. At present there is no such evidence and there is no evidence that the prediction of utility for every compound named is not sound and reasonable.

[33] There are two ways in which claims containing a prediction are usually attacked under section 2: either by showing that some embodiment lacks utility or, more commonly, that the prediction relied upon is not sound (see, *inter alia*, the recent decisions: *Eli Lilly* and *Purdue Pharma v. Pharmascience*, 2009 FC 726, 77 C.P.R. (4th) 262).

[34] The distinction between challenges based on a lack of sound prediction and challenges alleging something claimed lacks utility was noted in *Wellcome* at para. 56:

> If a patent sought to be supported on the basis of sound prediction is subsequently challenged, the challenge will succeed if, *per* Pigeon J. in *Monsanto Co. v. Canada (Commissioner of Patents)*, [1979] 2 S.C.R. 1108 (S.C.C.), at p. 1117, the prediction at the date of application was not sound, or, irrespective of the soundness of the prediction, A[t]here is evidence of lack of utility in respect of some of the area covered@.

[35] When the soundness of a prediction is called into question, the implication is that a person skilled in the art could not have soundly made the prediction to begin with and therefore, while the

prediction may turn out to have been correct (i.e. the prediction does not include matter that does not work), the Applicant was nevertheless not entitled to make it based on what was known, done and disclosed as of the filing date. But what >evidence= is required to be presented by the Examiner in rejecting predictions as being unsound?

[36] Guidance is provided in section 17.03.04, and mirrored in section 12.09, of the *Manual of Patent Office Practice* (MOPOP) as to the sort of >evidence= an Examiner is expected to produce when making objections to claims lacking a sound prediction of utility:

> An objection contending an applicant=s sound prediction is flawed should be supported by setting out sufficient facts and reasoning to rebut the applicant=s contention. The applicant must be given a sufficiently clear argument by the examiner that they are able to respond in an informed manner to those concerns raised by the examiner.
>
> . . . . Where the defect is of the nature that no factual basis appears to exist or that no line of reasoning appears to exist (whether by explicit disclosure or in view of the common general knowledge of the person skilled in the art), the Areasoned argument@ can be simply identifying these apparent omissions.

[37] As suggested in this section of MOPOP, depending on the nature of the defect the only realistic option for an Examiner making a lack of sound prediction objection may be to identify omissions in the factual basis and sound line of reasoning in some detail. In the objection, the Examiner should endeavour to clearly show where the gaps are between the factual basis, the sound line of reasoning, and the prediction made in the claim. It may otherwise be impractical for an Examiner to show that a prediction is not sound via direct evidence of its unsoundness; the practical and procedural limitations inherent in the examination process may preclude stronger >evidence= being produced to support the position. The onus is then on the Applicant to address these highlighted gaps, and thus defend the soundness of the prediction, or amend to restrict the prediction to overcome the objection.

[38] That said, a balance must be struck during examination, with the Examiner clearly noting why it is perceived that the prediction is not sound, by way of the criteria (i.e. the test) set forth in *Wellcome*, such that the Applicant can appreciate the case to be met. It should be remembered that an objection to a prediction being unsound is based on the Examiner=s appreciation of the facts they are aware of. If the case to be met is appropriately presented, it provides an opportunity for the Applicant to alter or correct this appreciation, point out possible oversights, and possibly show that the prediction is in fact sound. Even if the objection is not overcome this way, it at least can serve to bring further focus to the issue.

[39] During prosecution of the present application the Examiner addressed the factual basis, sound line of reasoning and proper disclosure requirements, and drew the conclusion that the prediction was not sound across the scope of the claims. The Applicant was of the opposite opinion but unable to convince the Examiner, and hence the need for this review and Decision on this ground.

CONCLUSIONS FROM THE APPLICANT=S ARGUMENTS

[40] The foregoing addresses the question of whether the doctrine of sound prediction applies to new compounds and if it does, whether the standard is lower for predicting the utility of new compounds than for new uses of old ones; the former in the affirmative, the latter in the negative. Also addressed was the evidence required of the Examiner in making an objection to a claim as lacking a sound prediction of utility.

[41] The only argument presented by the Applicant that has yet to be addressed is that the specification provides support that other subscript values or >amounts= of the elements in the nominal formulae will work (see para. 29). To address this, we will note at the outset that simply stating the utility is insufficient on its own to lead to a finding that the prediction is sound. Instead, that determination must be made via the tripartite *Wellcome* test in our analysis that follows.

ANALYSIS C SOUND PREDICTION

[42] At this point it would be helpful to reiterate and re-summarise the scope of the claims with respect to the $M^*_aA^*_bO_y$ values (from paras. 12B20). This is presented below in Table 1.

Table 1: Summary of the independent claims= scope.

Claim	$M^*_aA^*_bO_y$ Format (b = 1)
1	a = 1B2
3	a = 1 (avg.)[H] and 0.75
4, 13, 17 and 22	a = 0.11B3
11	a = 0.75
15	a = 1B2

[H] >(Avg.)= refers to the value of >a= in the material as a whole, while the other value applies to the superconductive phase alone (*cf.* para. 14).

[43] In the Final Action, the Examiner alleged that there is no factual basis presented for the prediction, and that there is no line of reasoning articulated in the disclosure. Specifically, the Examiner opined in the Final Action:

> The fact that a specification is directed to a person skilled in the art does not obviate the requirement for an enunciated factual basis and sound line of reasoning.

[44] What the Examiner contends as a requirement in a sound prediction has been reiterated in recent jurisprudence. As noted in the Federal Court proceedings of *Eli Lilly* (at para. 73), the factual basis must be disclosed:

> Sufficient work must be done such that the result claimed was actually achieved or was soundly predicted. However, that achievement or that basis from which the sound prediction was made must also be disclosed.

[45] This same judgment indicates the explicit requirement that this disclosure be in the patent and not elsewhere. From paragraphs 163 and 164:

> The person skilled in the art was given, by way of disclosure, no more than such person already had. No Ahard coinage@ had been paid for the claimed monopoly. Thus, for lack of disclosure, there was no sound prediction. . . .
>
> The public should not be left to scour the world's publications in the hope of finding something more to supplement or complete a patent disclosure.

[46] As far as disclosing the line of reasoning, this too has been recently noted to be required in the Federal Court of Appeal level of *Eli Lilly* (at para. 14). It appears that this could be satisfied, for example, by in some way showing how various species in a claimed genus could be expected to share the same utility as those forming the factual basis. In *Wellcome*, the underlying facts were the test data and the sound line of reasoning was the disclosed chain terminator effect.

FACTUAL BASIS

[47] The Examiner has summarised the factual basis taught in the disclosure in some detail in the Summary of Reasons, though it appears that not all of the relevant data was included. The application provides a fair amount of data for three compositions, referred to as BCSCO-a, BCSCO-b and BCSCO-c (see para. 22), corresponding to a ratio of the elements of 1:1:1:1, 1:1:1:2 and 1:1:1:3, respectively. Also included was a description of the phase identified as being responsible for providing the materials with a T_c of 77 K or above (the >superconducting phase=; see para. 14), along with a Cu-rich material discussed, below. To aid in comparison with the claims, these can be reformulated into the now familiar $M^*_aA^*_bO_y$ format (again setting b = 1), and the values for >a= summarised in Table 2.

Table 2: Summary of the exemplified compositions.

Composition Name	Ratio of Elements (Bi:Ca:Sr:Cu)	$M^*_aA^*_bO_y$ Format (b = 1)
BCSCO-a	1:1:1:1	a = 1
BCSCO-b	1:1:1:2	a = 0.66
BCSCO-c	1:1:1:3	a = 0.5
Superconducting Phase	2:1:2:2	a = 0.75

Cu-rich sample	1:22:14:6.2	a = 5

[48] Although mentioned by neither the Examiner nor the Applicant as forming part of the factual basis, there is described at page 24 of the disclosure (and included in Table 2) a copper-rich material that corresponds to a = 5, once reformulated into the $M^*_aA^*_bO_y$ format. The surrounding text indicates that a great majority of the sample belonged to the superconducting phase, which was identified as being responsible for the superconductivity of the materials and which itself had a T_c of 90 K. It therefore has a direct and important impact on the factual basis being relied upon.

[49] As mentioned previously, in the Final Action the Examiner argued that the a = 0.66 example actually did not become superconductive at 77 K or above, according to the graph shown in Figure 2 (see para. 26). Although the Applicant has never adduced evidence to refute this, we note that the composition in question, BCSCO-b, is shown in Figure 8 to able to achieve superconductivity depending on the temperature at which it is prepared. Therefore, it cannot be concluded that a = 0.66 will not work in the sense that it will not allow superconductivity to be achieved at 77 K or above. Rather, it is evident that it *can* be made to work, provided the reaction conditions are controlled appropriately. Indeed, any of the materials can be made to be non-superconductive if the instructions provided in the disclosure are not followed. However, the person skilled in the art is understood to have a mind willing to understand the invention, and Ahe is assumed to be a man who is going to try to achieve success and not one looking for difficulties or seeking failure (*Free World Trust v. Électro Santé Inc.* [2000], 2 S.C.R. 1024, 9 C.P.R. (4th) 168; citing: H. G. Fox, *The Canadian Law and Practice Relating to Letters Patent for Inventions* (4th ed. 1969), at p. 184). The example whereby a = 0.66 did not achieve the promised result therefore cannot be dismissed outright as showing a lack of utility; instead, this example serves to show the dependence of the final product on the preparation method.

[50] The factual basis therefore includes compositions where a = 0.5B5. Whether this is sufficient to base a sound prediction on is a function of the scope of the prediction being made, and the sound line of reasoning being relied upon to extrapolate from what was done to what is predicted.

SOUND LINE OF REASONING

[51] The sound line of reasoning underpinning the present extrapolation from the factual basis cannot be concisely stated as being any one particular thing (*cf.* Athe chain terminator effect@ in *Wellcome*), but rather hinges on a couple of considerations. The first is the fact that the factual basis extends from a = 0.5B5. The higher end of the range for >a= in the claimed formulae is a = 2 (independent claims 1 and 15) or a = 3 (independent claims 4, 13, 17 and 22). These values lie squarely within the range of >a= shown to work. Without any reason to suggest otherwise, it

makes a certain intuitive sense that if two extremes of a range are shown to work (i.e. 0.5 and 5), then values within the range would be expected to also work.

[52] Secondly, not only does the a = 5 composition contribute to the factual basis, but it also underscores the degree of variation acceptable in the formula, while still allowing the utility to be achieved. The fact that the range of >a= in the compositions that fulfils the promised utility is relatively broad⊂there is an order of magnitude between the lowest (0.5) and highest (5) values⊂suggests that there is less reliance on a specific value for >a=, but some compositional flexibility is permitted. A line of reasoning can be drawn from this fact; *viz.*, that a certain degree of variation is not detrimental to the utility of the compositions as superconductors, so various undemonstrated values for >a= would also be expected to allow the desired effect to be achieved. This is especially evident when one recalls that these materials comprise multiple phases. If there is slightly more of a particular phase, the nominal formula may reflect higher or lower values for >a=, while still being able to achieve superconductivity at 77 K or higher.

[53] As shown in Table 2, the lowest value of >a= for which there is a factual basis is 0.5. Claims 4, 13, 17 and 22, however, extend beyond the factual basis at the low end of the range; these claims allow for a = 0.11 at minimum.

[54] In none of the Office Actions (including the Final Action) raising a sound prediction objection, is there any indication of what values for the subscripts form the ground for the objection. It is from the Brief that we know that the Examiner is taking issue with values for >a= greater than 1, and no mention is made of values for >a= that range down to 0.11. Despite this, these lower values need to be considered as well, since it is here that the prediction moves outside of what the factual basis directly supports.

[55] Although knowing how an invention works is not required for patent protection (*Wellcome*, para. 70), an understanding of how the invention works could help bolster the sound line of reasoning linking what was done to what is predicted. The disclosure teaches that certain structural features were identified in the compositions that had transition temperatures of 77 K or higher. From page 5b:

> A crystalline form in which Cu-atoms are in planar configuration is required for high T_c. The crystalline form that provides for high T_c is a perovskite related structure with substantial deviations from the ideal perovskite arrangement of metal atoms.

[56] Although not certain on this point, the disclosure teaches that the materials may adopt a copper-oxygen planar configuration:

> It may be speculated that copper and oxygen adopt the planar configuration common to the other known high-temperature oxide superconductors, but there is not yet any direct evidence to support this supposition.

[57] After showing that the crystal structure of the claimed superconductors is similar to that of related known high-temperature superconductors (e.g. those including a lanthanide, scandium or yttrium), the inventor=s >speculation= seems reasonable.

[58] Low values for >a= mean that the total of bismuth/thallium and copper is high relative to the total of the alkaline earth metals. Since we have found the assumption that it is the copper-oxygen planarity that is responsible for the superconductivity to be reasonable, it is probable that the extra bismuth/thallium and copper, coupled with the reduced presence of the alkaline earth metal, is not necessarily detrimental to the materials achieving the promised result of high-temperature superconductivity. On considering the balance of probabilities, we do not find there to be sufficient grounds to fault the sound line of reasoning supporting a prediction for values of >a= down to 0.11.

PROPER DISCLOSURE

[59] As for proper disclosure, this requirement of the test is that the factual basis and the sound line of reasoning be found in the disclosure. In the present case, all the compositions forming the factual basis were taught, as was the information used to establish a sound line of reasoning. For this reason, we conclude that the proper disclosure criterion has been satisfied.

CONCLUSIONS C SOUND PREDICTION

[60] In light of the fact that these materials are multiphase oxides and the nominal formulae take into account the phases which are not superconductive as well as those that are, combined with the factual basis and the sound line of reasoning relied upon and outlined above, we believe there are insufficient grounds for concluding that there can be no sound prediction of utility for compositions falling within the scope of the claims. For this reason, we cannot agree with the Examiner=s position that claims 1, 3, 4, 5, 7, 8, 10, 13, 15, 17, 21 and 25 do not comply with section 2 of the *Patent Act*.

ADDITIONAL NOTES

[61] Claim 11 was not objected to by the Examiner for lacking sound prediction. On its face, it seems to claim a composition that has the nominal formula of the superconducting phase (see para. 19 and Table 2); however, we previously noted an absence of any mention that the material is an oxide. It is clear from numerous places in the disclosure that the compositions are oxides, and

there is every indication that oxygen plays an integral role in making the compositions able to become superconductive. In fact, the superconducting phase is itself an oxide. From the disclosure:

> In the new structure that provides T_c > 77EK, copper-oxygen layers appear to be continuous over hundreds of unit cells. [page 6].
> . . .
> The nominal composition of that phase determined to be the phase responsible for the high temperature superconduction has been determined to be as follows:
> $Bi_2Ca_1Sr_2Cu_2O_{8+\delta}$ (2:1:2:2) [page 9]
> . . .
> The optimum reaction time is dependant upon the elemental composition of the oxide complex being prepared and the reaction temperature . . . [page 13].
> . . .
> Many of these defects are probably associated with interfaces between perovskite and the Bi_2O_2 modules . . . [In reference to a single grain of the superconducting phase on page 18].
> . . .
> It may be speculated that copper and oxygen adopt the planar configuration common to other known high-temperature oxide superconductor, but there is not yet any direct evidence to support this supposition. [page 20].

[62] The above passages are in addition to many other references to the materials as >oxides=, and the absence of anything in the disclosure directly teaching that oxygen may be omitted.

[63] Without including oxygen, the claim encompasses compositions for which there is no hint that utility is expected. There is an absence of suggestion in the disclosure that there was any intent to claim compositions that are not oxides; this claim therefore does not seem consistent with what is being taught to be the invention. Without limiting the compositions to oxides, the person skilled in the art would not be able to soundly predict that compositions with a 2:1:2:2 ratio of Bi:Ca:Sr:Cu, with no oxygen present, would exhibit zero electrical resistance at a temperature of 77 K or higher. We would then have to conclude that the subject-matter of claim 11 could not be soundly predicted to have the promised utility across its entire scope.

THE SECOND OBJECTION: DESIRED RESULT

[64] The second ground for rejection presented by the Examiner in the Final Action is that claims 1B13 and 15B21 do not comply with subsection 34(2) of the *Patent Act*, for being directed to a desired result.

STATUTORY AUTHORITY

[65] To begin, the statutory authority for the objection should be considered. Subsection 34(2) of the *Patent Act* reads as follows:

> 34(2) The specification referred to in subsection (1) shall end with a claim or claims stating distinctly and in explicit terms the things or combinations that the applicant regards as new and in which he claims an exclusive property or privilege.

[66] The language of this subsection is reflected, with amendments, in subsection 27(4) of the >new= *Patent Act* (i.e. as it reads post October 1, 1996), reproduced below for comparison:

> 27(4) 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.

[67] The language in these sections is therefore very similar and sets the requirement that the claims define their subject-matter using distinct and explicit terms. While this may be the case to be met according to the section of the *Patent Act* cited, we will consider the objection as it stands, not necessarily limiting the analysis to the degree to which the claims are stating their subject-matter distinctly and in explicit terms.

THE EXAMINER=S POSITION

[68] The objection is presented here in the words of the Final Action:

> Claims 1, 3, 4, and 13 do not comply with subsection 34(2) of the *PATENT ACT* in effect just before 1 October 1989. The material is defined in terms of the desired result of it having a critical temperature of 77EK or higher, without giving the necessary conditions to achieve the result.
>
> The Applicant has added further definition to the material in the claim from the previous set of claims, restricting its scope from all such materials to those of a certain nominal composition. The difficulty is that not all such materials of that nominal composition have the desired characteristic. The material must be defined further to avoid those compositions that do not have the desired characteristic.
>
> . . .
>
> The material must be defined without restating the characteristics which were being sought. This is merely repeating the research objective without distinctly defining that which is the alleged invention.
>
> . . .
>
> The Applicant has attempted to restrict the claims by defining the composition by its desired characteristics of high critical temperature. In effect, this practice attempts to claim compositions made by processes other than what the Applicant has invented and described.
>
> . . .
>
> These claims could be made acceptable by including in the claim the process by which the superconducting compositions can be made, thus making them product-by-process claims.
>
> . . .
>
> The Applicant further states that the inter-relation of reaction temperatures, quenching rate, reaction temperature [*sic*] and oxide compositions must be taken into account in working this invention. The influence of each of these parameters is so unclear and variable (as shown by the Applicant=s data) that simply stating that they are inter-related is not good enough to give an infallible result.

[69] In the Brief, the Examiner provided a bit more detailed reasoning:

> The difficulty is that the Applicant is relying on the desired property of the composition to define it. This might be acceptable if all compositions with the claimed nominal composition had this property. Unfortunately, they do not all have a T_c of 771K of higher.
>
> On page 11 lines 34 to 36, the Applicant states that Asample preparation parameters can affect the electronic and magnetic properties of the $T_dM^*_eCu_fO_g$ class of oxide compounds drastically.@

> On page 12 lines 4-7, and page 12 line 35 to page 13 line 2, the Applicant states that materials of the claimed composition can be insulating, which is far from superconducting.
>
> On page 12 lines 35 to page 13 line 2 he states that reactions carried out at temperatures significantly lower than as discussed above generally result in an oxide complex that has only insulating or semiconducting electrical properties rather than superconducting properties.
>
> Making a superconductor depends to a great extent upon the process for making it. Not all processes will produce superconductors. The known parameters of reaction temperature, ambient atmosphere, quenching rate, oxide composition, reheating rate, annealing regime and annealing temperature must be chosen from restricted ranges in order for the desired result to be attained. As he admits, not all combinations of parameters involving those compositions work. On the other hand, there may be other parameters and combinations of them (or procedures) which are yet to be discovered. The Applicant has discovered one combination of parameters involving some compositions that produces the desired result. He is not entitled to other combinations that he has not investigated. The claims attempt to claim such other uninvestigated processes. What he has claimed goes beyond what he has invented. He has not claimed his invention in distinct and explicit terms.

[70] The following points were distilled from the Final Action and the Brief, and which underlie the second objection:

$ The claims are simply restating the research objective without properly defining the invention.

$ Not all the materials of the nominal compositions have the desired characteristics. They must be defined further to avoid those compositions that do not.

$ The material must be defined without restating the characteristics which were being sought. Failure to do so is merely repeating the research objective without defining the invention.

$ Restricting the claims by defining the material by its desired characteristics attempts to claim compositions made by processes other than what the Applicant has invented and described.

$ The influence of the experimental parameters is unclear and variable, so simply stating that they are interrelated is not good enough to give an infallible result. The superconductors are very process-dependent.

$ The Applicant has discovered one combination of parameters involving some compositions that produce the desired result; other compositions, not yet investigated, cannot be claimed.

$ The claims attempt to claim processes that have not been investigated.

$ The Applicant=s invention has not been claimed in distinct and explicit terms.

[9] The objection refers to the claims being directed to a desired result, and touches on enablement, utility and the claim scope. Each of these elements will therefore be discussed.

THE APPLICANT=S ARGUMENTS

[10] As noted, the Applicant did not supply any submissions subsequent to the response to the Final Action, so nothing additional was received after the further elaboration was provided by the Examiner in the Brief. In response to the objection as it stood in the Final Action, the Applicant argued that:

> 5) A person skilled in the art would have no difficulty with the language of the claims.
>
> 6) In light of the above, restricting the claims to the process by which they were made is unjustified; one skilled in the art would know what parameters to avoid and what the appropriate reaction conditions would be to achieve the desired result, as supplied by their knowledge and the guidance provided by the disclosure.
>
> 7) MOPOP advises that the product claims may be defined in three ways: by structure, in terms of the process by which the product is made, or in terms of its physical or chemical properties. As the Applicant has defined the compositions in terms of their chemical structure and properties, there is no need for further restriction based on process.

ANALYSIS C DESIRED RESULT

[11] To address this objection, we will consider each of the points raised by the Examiner, (as summarised in para. 80), combining them where convenient, and referring to the Applicant=s arguments were appropriate.

[12] The first point to be addressed is the premise for the Examiner=s position; *viz.* that claims 1B13 and 15B21 are directed to a desired result without giving the necessary conditions to achieve the result.

[13] The unacceptability of claiming mere desired results does not appear to be at issue, but we view the suggestion that, absent any further structural or process limitations (or other Aconditions@), the claims are Amerely restating the research objectives@ as inaccurate. The claims include a limitation on which atoms are present in the material and their proportions by way of the nominal formulae. Although there may be many compounds that satisfy them, the nominal formulae nevertheless substantially restrict the scope of the claims in a meaningful manner. In other words, a nominal formula helps limit the desired result analogously to the way the desired

result helps to limit the formula to only include those compositions achieving it, which focuses the claim-scope on what was invented.

[14] We therefore cannot agree that the claim is simply directed to a desired result, or that it is merely repeating the research objective, without further consideration of the facts of the case. Having a desired result appended to a claim is not automatically grounds for rejection; the result serves as a functional limitation on the claim that may in fact be appropriate and acceptable. *Burton Parsons Chemicals Inc. v. Hewlett-Packard (Canada) Inc.*, [1976] 1 S.C.R. 555 (*Burton Parsons*), *inter alia*, provides precedence for such limitations being acceptable in the claims.

[15] In *Burton Parsons*, an electrocardiograph cream for use with skin contact electrodes and compatible with normal skin was claimed that comprised a stable aqueous emulsion containing a highly-ionizable salt. The court recognised that:

> If the patent is to have a practical value, it must cover all the emulsions and salts which can yield the desirable result namely, all Aemulsions with the outer phase or the continuous phase being water@ and all salts that are highly ionizable enough to carry an electric current with low resistivity on the skin excluding only such substances as are not compatible with normal human skin. The evidence makes it clear that this was obvious to any person skilled in the art because the characteristics of suitable emulsions and of suitable salts were well known. Only the combination was new.

[16] In that case, the functional limitations imposed on the cream (skin compatible and good conductivity) and the salts (highly-ionizable) were considered appropriate to allow for claims with what was considered the deserved scope of protection.

[17] Therefore, contrary to the Examiner=s position, we are of the view that the desired result may be an important feature to have in the claims; it was in *Burton Parsons*, and is in the present case. The desired result may appear in a claim to disclaim subject-matter never intended to be claimed and to provide a context for what the claim defines; it helps inform the skilled person what the scope of the monopoly is. We therefore do not see anything inappropriate about including mention of the fact that the BCSCO compositions are superconductors with a T_c of 77 K or higher, since that is what was stated to have been invented and is effectively stating the promised utility of the compositions.

[18] The Examiner argued that repeating the desired characteristics in the claims seeks to claim compositions made by processes other than what has been invented and described. Again, we see nothing inappropriate in this. For comparison, it is a commonplace and well-accepted practice in the chemical arts to claim compounds by structure, independent of any process. This is despite the fact that only a single route to make the claimed compound need have been taught to make the product. The same reasoning should apply here: what is being protected is the product, not necessarily the processes (though they may be claimed as well). The Applicant has invented a composition of matter, and is entitled to gain a monopoly on it independent of how it is made. For

this reason, we are of the view that process limitations are not required here.

[19] Related is the Examiner=s contention that the Applicant is trying to claim other processes beyond those disclosed. Since none of the claims are directed to processes, *per se*, the point is moot because the Applicant is seeking protection for compositions not processes.

[20] The next point to be addressed is that not all of the nominal compositions have the desired characteristics and further definition is thus needed to avoid those that do not. In the Final Action, references are made to passages in the disclosure that indicate that not all nominal compositions will fulfil the promised utility; whether they will is a function of how the samples are prepared. This is evident from page 11 of the disclosure, which was referred to by the Examiner in the Brief, where it is stated:

> Sample preparation parameters can affect the electronic and magnetic properties of the $T_dM^*_eCu_fO_g$ class of oxide compounds drastically. It has been observed that the formation conditions for $T_dM^*_eCu_fO_g$ for different AT=s@ are different. The reaction time, the reaction temperature, the quenching rate, the reaction atmosphere and the compositions are all inter-related. For instance, oxide complexes within this class can be made insulating, partially superconducting or completely superconducting by varying the reaction temperature and the quenching rate while keeping the compositions unchanged.

[21] There can therefore be little doubt that not all compositions that satisfy a given nominal formula in the claims will have the desired result/promised utility. While on its face this may seem problematic, the reality is that in fields such as ceramics/materials, where the exact structure of a product may defy full elucidation, it may be reasonable to claim the product by the nominal formula coupled with a functional limitation in the form of a desired result. Whether it is appropriate will depend, *inter alia*, on whether there is sufficient teaching to enable a person skilled in the art to achieve the desired results for the range of compositions the formulae encompass.

[22] Section 17.07.04 (January 2009) of MOPOP discusses some considerations to be made in dealing with functional limitations in claims. The following is excerpted from that section:

> Functional limitations must always be considered from the perspective of the person skilled in the art, and the question to be asked is: Acan the person skilled in the art practice the full breadth of the claim without recourse to inventive ingenuity?@

[23] The quote within the passage encapsulates the main question to be answered in determining the propriety of a functional limitation in a claim. While functional language may be allowed in general, not all such limitations will pass muster in all situations (see the example in this section of MOPOP, for instance); the determination is made based on the facts of the case.

[24] In the case at hand, we are not satisfied that a person skilled in the art would have had to resort to inventive ingenuity in order to practice the full breadth of the claims, based on the extent

of the disclosure and the degree of enablement it affords.

[25] On this topic, it is mentioned in the disclosure (at page 12) that factors such as heat, temperature, oxygen concentration, etc. dictate the final product, and that the optimisation of these parameters is routine. Additionally, included within the disclosure is an explanation of how to monitor the reaction for the formation of the desired product (page 13). These materials clearly were not the result of a slapdash mixing of starting materials, but were the products of a monitored and deliberate protocol that the person skilled in the art is instructed to follow, the instructions for doing which were provided in the disclosure and supplemented by the skilled worker=s common general knowledge, while allowing routine experimentation to get it right. The Applicant pointed out that the disclosure taught what the relevant reaction conditions to control are, in response to the Final Action. The Examiner, however, maintained that the influence of these parameters was unclear and variable, and noted that simply saying they are inter-related is Anot good enough to give an infallible result.@

[26] It seems that the bar has been set rather high by this statement, and it should be borne in mind that the disclosure is addressed to a person skilled in the art (*cf*. para. 59). That person has a certain degree of awareness, knowledge and aptitude, but infallibility is not expected. Instead, it is understood that they may have to perform routine/uninventive experimentation to get the invention to work, especially in light of the fact that the products are acknowledged to be very process-dependent. In this case, the person skilled in the art would be expected to, armed with an understanding of what the relevant experimental parameters are and how to monitor the reaction to ensure the superconductive phase is being formed, be able to adjust the reaction conditions to get the desired results. The disclosure would appear to not only allow the skilled person to make useful products, but to avoid those inutile ones that may share the same nominal formula. While this would not necessarily be an inevitable result, there are insufficient grounds upon which to conclude that the notional skilled person could not succeed without any undue amount of experimentation or recourse to inventive ingenuity. Therefore, based on the detail in the disclosure, we do not see grounds for finding that a person skilled in the art would not be able to make the compositions of the given formulae achieve these results, or would need to exercise inventive effort to do so.

[27] As noted by the Applicant, MOPOP (section 11.08) endorses claiming products in one of three different ways: by structure, in terms of the process by which they are made, or in terms of their physical or chemical properties. It appears that while it is appropriate to claim the present superconductors via the processes by which they were made, the latter is also befitting the technology.

[28] In finding that the disclosure would guide the person skilled in the art in making

compositions falling within the scope of claims 1B13 and 15B21 with the promised utility we are also stating that, at least in this case, further limitations on the claims are not necessary. Therefore, we find that the extent of the disclosure supports the claiming of the formulae, restricted to not only the *desired* but the *achieved* result via a functional limitation.

[29] The final point raised by the Examiner in the Brief also concludes the reasons why the defect was identified: the Applicant has not claimed the invention in distinct and explicit terms. The Applicant=s argument was simply that a person skilled in the art would have no difficulty with the language of the claims. In light of our finding that the claims are not simply directed to a desired result, they are not ambiguous or indefinite for this reason. We agree that they would be understandable to the skilled person. In view of our finding that the claims are not inappropriate for the subject-matter and art, we do not feel that this point warrants any further consideration; the claims are not indistinct or inexplicit.

CONCLUSIONS C SUBSECTION 34(2) OBJECTION

[30] For the foregoing reasons, we do not agree with the Examiner=s assessment that claims 1B13 and 15B21 do not comply with subsection 34(2) of the *Patent Act*.

>OLD ACT= CONSIDERATIONS

[31] Since this application was filed under the auspices of the *Patent Act* as it read immediately before October 1, 1989 (i.e. the >Old Act=), there remains the requirement that otherwise allowable claims be evaluated under section 43 to determine whether conflict proceedings are warranted. Such an evaluation is made by an Examiner charged with the task. The potential involvement of, and impact on, third parties necessitates this two-stage approach. The application will therefore be returned to the Examiner for this determination, subsequent to the completion of the required Rule 31(*c*) amendments in accord with this Decision.

RECOMMENDATION AND RULE 31(*C*) AMENDMENTS

[32] For the reasons above, it is our recommendation that the rejection of the Application be reversed.

[33] We further recommend that in accordance with paragraph 31(*c*) of the *Patent Rules*, the Commissioner inform the Applicant that the following amendment is necessary for compliance with the *Patent Act*:

(1) Claim 11 must be amended to only specify that only >oxide= compositions are

included within the scope of the claim. Alternatively, claim 11 may be deleted.

[34] Finally, we recommend that:

(2) the Applicant be invited to make only the above amendment within three months from the date of the Commissioner=s Decision;

(3) the Applicant be advised that, if the above amendment and only the above amendment, is not made within the specified time, the Commissioner intends to refuse the application; and

(4) the Applicant be advised that, if the above amendment and only the above amendment, is made within the specified time, the Commissioner intends to return the application to the Examiner for allowance, unless proceedings under section 43 of the *Patent Act* are required.

	Ryan Jaecques		Mark Couture		Paul Sabharwal	
	Member		Member		Member	

COMMISSIONER=S DECISION

[35] I concur with the findings and recommendations of the Patent Appeal Board. Accordingly, I invite the Applicant to make the above amendment, and only the above amendment, within three months from the date of this Decision. If this amendment, and only this amendment, is made within the specified time, the Examiner=s rejection will be considered to have been overcome. The application will then be returned to the Examiner for possible proceedings under section 43 of the *Patent Act*.

Mary Carman
Commissioner of Patents

dated at Gatineau, Quebec,
this 4th day of June, 2010.