

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* YOSHIO SUGAYA, HIROSHI TODA,  
YUKIO MATSUMURA, and HIROHISA KUBOTA

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Appeal No. 2005-1907  
Application No. 09/909,898

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HEARD: September 15, 2005

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Before GARRIS, WARREN, and TIMM, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

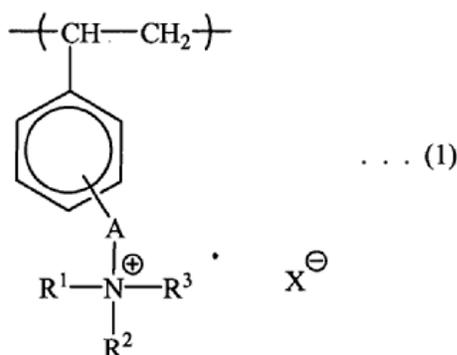
***DECISION ON APPEAL***

This appeal involves claims 1-12 which are all the claims pending in the application. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 134.

### INTRODUCTION

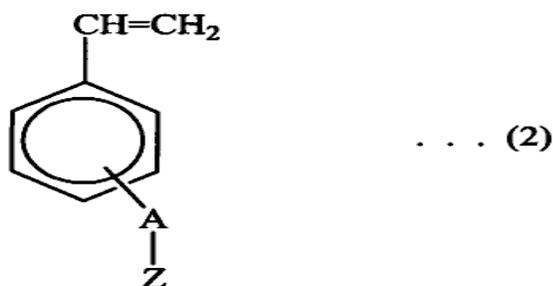
The claims are directed to an anionic exchange membrane, a process for producing the membrane, and solution treating apparatus employing the membrane. Claims 1 and 5 are illustrative:

1. An anion exchange membrane comprising a resin phase which contains from 20 to 96 mass% of a polymer having repeating units represented by the following formula (1):



wherein A is a C<sub>3-8</sub> alkylene group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9, each of R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> is a hydrogen atom, a C<sub>1-6</sub> alkyl group or a hydroxyalkyl group, and X is an anion, and wherein any hydrogen atom bonded to the benzene ring may be substituted by an alkyl group or a halogen atom, and from 4 to 80 mass% of a thermoplastic polymer having no ion exchange groups, mixed substantially uniformly.

5. A process for producing an anion exchange membrane, which comprises mixing a thermoplastic polymer having no ion exchange groups with a polymerizable component comprising a monomer of the formula (2):



wherein A is a C<sub>3-8</sub> alkylene group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9, and Z is chlorine, bromine, iodine, a hydroxyl group, a tosyl group, a primary to tertiary amine, or a -NR<sup>1</sup>R<sup>2</sup>R<sup>3</sup> group, wherein each of R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> is a hydrogen atom, a C<sub>1-6</sub> alkyl group of a hydroxyl group, and wherein any hydrogen atom bonded to the benzene ring may be substituted by an alkyl group or a halogen atom, or a mixture of the monomer of the formula (2) and a monomer copolymerizable therewith, and then polymerizing the polymerizable component.

As evidence of unpatentability, the Examiner relies upon the following prior art

references:

|                        |           |              |
|------------------------|-----------|--------------|
| MacDonald              | 5,045,171 | Sep. 3, 1991 |
| Terada et al.( Terada) | 5,759,373 | Jun. 2, 1998 |

The specific rejections are as follows:

1. Claims 1-4, 11, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Terada taken with Tomoi;
2. Claims 5-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Terada taken with Tomoi and further in view of MacDonald; and
3. Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Terada taken with Tomoi and further in view of MacDonald and further in view of Akao or Osterholtz or Sata or Saad or Chau.

With respect to the rejection of claims 1-4, 11, and 12, we reverse. With respect to the rejection of claims 5-10, we affirm. We further remand to the application to the Examiner for further consideration.

### ***OPINION***

#### ***The Rejection of claims 1-4, 11, and 12 over Terada and Tomoi***

Claims 1-4, 11, and 12 all require an anion exchange membrane comprised of a polymer of formula (1) and a polymer having no ion exchange groups “mixed substantially uniformly.” As pointed out by Appellants (Brief, p. 5), the specification provides a definition for the phrase “mixed substantially uniformly.” According to the specification “‘mixed substantially uniformly’ means that when the resin phase is observed by an optical microscope, the polymer of the formula (1) and the thermoplastic polymer having no ion exchange groups can not be

distinguished, and phase separated structure containing phases having a size of more than 1  $\mu\text{m}$  can not be observed.” (specification, p. 5, ll. 7-14). The Examiner argues that the claim is not limited to the features recited in the definition because those features are not recited in the claims. This is because, according to the Examiner, limitations from the specification are not read into the claims (Answer, p. 7). Further, the Examiner finds Appellants’ definition indefinite and, therefore, insufficient to limit the claim on the basis that the critical parameters (e.g. magnification, type of light, staging, etc.) under which optical microscopes are operated are not given and, therefore, the definition affords no guidance to one of ordinary skill in the art (Answer, p. 7).

The Examiner’s claim interpretation is in conflict with the law. While the Examiner is correct that limitations from the specification are not read into claims, *see In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994)(It is improper to add an extraneous limitation from the specification into the claims), interpreting a claim term in light of a definition provided in the specification is not reading a limitation from the specification into the claims. There is a difference between interpreting a phrase within a claim in accordance with a definition set forth in the specification and adding extraneous limitations into the claim from the specification wholly apart from interpreting the words of the claim. Appellants here have chosen to be their own lexicographer by deliberately providing a definition of the claimed phrase “mixed substantially uniformly.” In such a case an appellant’s lexicography governs. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316, 75 USPQ2d 1321, 1329 (Fed. Cir. 2005)(en banc). The

present situation is not one in which there is only a general discussion of further features not needed to interpret the particular words at issue. In such a case, it is indeed improper to limit the claims to those features. *See In re Bigio*, 381 F.3d 1320, 1325, 72 USPQ2d 1209, 1210-11 (Fed. Cir. 2004)(While, according to the specification, the object of the invention was a hair brush for brushing scalp hair, the court declined to limit the claim terminology “hair brush” to hair brushes for brushing scalp hair because “hair brush” encompasses the brushing of other body hair and there was no express disclaimer of the broader meaning); *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1668 (Fed. Cir. 2000)(“The specification, although lengthy, contains no definition of ‘shared’ or ‘sharing’ that would require the Board to construe those limitations in the narrower manner asserted by Mr. Hyatt.); *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994)(The word “computer” in the claim was not restricted to the type of computer described in the specification because there was no specialized definition in the specification so restricting “computer” to that meaning. Instead “computer” found to encompass a calculator as the evidence showed that calculators were understood in the art to be computers, albeit of more limited in function than those described in the specification).

Nor can we agree that the definition provided in the specification is indefinite such that it fails to provide guidance to one of ordinary skill in the art as to how “mixed substantially uniformly” is to be limited. The definition requires that one be able to observe the resin phase and one of ordinary skill in the art would understand how to operate the microscope to perform the required observation. The specification need not describe the conventional adjustments

needed for operating the optical microscope for viewing the polymer mixture. We further agree with Appellants that there is no contradiction in terms within the definition resulting in a failure to understand how “mixed substantially uniformly” is to be limited (Brief, p. 2). A reasonable reading of this definition indicates that it simply provides a means of observing the mixture and creates a threshold maximum size for any phase separated domains within the mixture.

Turning to the prior art, we find that there is no evidence provided by the Examiner that the mixture suggested by the combination of Terada and Tomoi would have the structure required by claim 1, particularly the uniformity required by the definition of “mixed substantially uniformly.” Terada describes ion exchange particles bound by a binder polymer. The Examiner provides no evidence that the ion exchange particles and binder of Terada are mixed together such that observation of the mixture under an optical microscope reveals no phases of more than 1  $\mu\text{m}$  in size as required by the claim. In fact, Terada discloses a mixture of ion exchanger particles bound by a binder which suggests discrete particles adhered to one another with the binder. Terada discloses that the particle size of ion exchange particles is a minimum of 50  $\mu\text{m}$  (Terada, col. 3, ll. 27-38), a size much larger than 1  $\mu\text{m}$ . There is further no evidence that the heat-kneading or heat-mixing methods of producing the ion exchanger result in phases of less than 1  $\mu\text{m}$ . In fact, the ion exchanger can also be made by coating the ion exchange particles with the binder, indicating that the ion exchange particles are intended to remain at the 50-1000  $\mu\text{m}$  size (Terada, col. 3, ll. 27-39). Tomoi is relied upon by the Examiner only for the specific chemical structure of the ion exchange resin. We cannot say that the Examiner has established

that the mixture of Terada taken with Tomoi suggests the structure of the anion exchange membrane of claim 1.

We conclude that the Examiner has failed to establish a prima facie case of obviousness with respect to the subject matter of claim 1 and those claims dependent therefrom, namely, claims 2-4, 11, and 12.

***The Rejection of claims 5-9 over Terada, Tomoi, and MacDonald***

The rejection of claims 5-9 stands on a different footing. These claims are directed to a process involving in-situ polymerizing a monomer of formula (2) within a mixture including a thermoplastic polymer having no ion exchange groups. Here, the Examiner relies upon MacDonald as teaching a process for producing an anion exchange membrane including mixing a thermoplastic polymer having no ion exchange groups (powdered thermoplastic film-forming polymer; col. 8, ll. 5-13), in a dissolved state, with a functional monomer such as the monoethylenic functional monomer (g)(col. 4, ll. 52-60) and other components (col. 8, ll. 13-24) and then polymerizing by heat and/or ultraviolet light (col. 7, ll. 42-47) to achieve an anion selective membrane. Appellants do not point out any specific difference between the steps that MacDonald describes and the steps of claim 5, rather, Appellants argue that the monomer described by MacDonald is not the monomer required by the claim (Brief, p. 7). However, this argument does not uncover a reversible error by the Examiner because the Examiner does not rely upon MacDonald for a teaching of the specifically claimed monomer, Tomoi is relied upon in that capacity.

Appellants acknowledge that MacDonald describes mixing a thermoplastic polymer having no ion exchange groups with a polymerizable monomer comprising a vinylbenzyltrialkylammonium chloride (Brief, p. 7). That monomer is a close homolog to the monomer of formula (2) recited in claim 5. Moreover, Tomoi indicates that anion exchangers polymerized from the monomers of formula (2) have excellent heat durability (Tomoi, col. 3, ll. 41-51). Tomoi also indicates that the shapes of the anion exchangers are not particularly limited and can include membrane-like shapes (Tomoi, col. 7, l. 59 to col. 8, l. 8). Under the circumstances, there is a suggestion arising from within the prior art to use the monomer of Tomoi in the process of MacDonald to form a heat durable membrane.

We conclude that the Examiner has established a prima facie case of obviousness with respect to the subject matter of claims 5-9. A discussion of Terada is not required here.

***The Rejection of Claim 10 over Terada, Tomoi, MacDonald and further in view of Akao or Osterholtz or Sata or Saad or Chau***

Claim 10 requires irradiation of a porous membrane-supporting material before or when the polymer and monomer mixture is impregnated thereto. The Examiner finds that such irradiation of the polymers of the membrane supporting materials was known in the art and that it would have been obvious to one of ordinary skill in the art to irradiate the membrane supporting material of MacDonald to obtain the known effects (Answer, pp. 6-7).

With respect to claim 10, Appellants argue that the references additionally relied upon by the Examiner to reject this claim “manifestly do not relate to an anion exchange resin membrane

of the nature as claimed resulting in additional unobvious improvements, as note [sic] page 14, lines 9-18 of the specification. Such irradiation additionally thus is unobvious even considering the teachings of these further references.” (Brief, pp. 7-8). Looking to the specification, page 14, lines 9-18 indicate that the membrane-supporting material is irradiated “to secure adhesion between the porous substrate and the membrane, from the view point of the electrical resistance, mechanical strength and long term durability of the obtainable reinforced membrane.” There is no indication in the specification that the improvements would have been unexpected by, or otherwise unobvious to, one of ordinary skill in the art. The Examiner has established that irradiation was conventionally performed on polymer surfaces for various effects including to promote adhesion. Those of ordinary skill in the art would have understood the applicability of the those teachings to the polymeric membrane-supporting material of MacDonald.

We conclude that the Examiner has established a *prima facie* case of obviousness with respect to the subject matter of claim 10.

Appellants argue that they have rebutted any *prima facie* case of obviousness based on comparisons set forth in the specification (Brief, p. 7; Reply Brief, pp. 3-4). These discussions seem to be directed to the rejection of the product claims, a rejection which we reverse. In so far as these discussions relate to the process claims 5-10, we conclude that the totality of the evidence weighs in favor of a conclusion of obviousness. Once a *prima facie* case of obviousness is established, the burden of coming forward with evidence and argument in rebuttal is shifted to appellants. *See In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir.

1984). Rebuttal may take the form of a comparison with the prior art showing that any differences are not merely normal expected variations but would have been unexpected by those of ordinary skill in the art. See *In re Mayne*, 104 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997); *In re Freeman*, 474 F.2d 1318, 1324, 177 USPQ 139, 143 (CCPA 1973). Appellants make a comparison between membranes made with a C<sub>1</sub> group as “A” in formula (2) as in Terada and MacDonald versus a C<sub>4</sub> group, as “A” as encompassed by the claim. We agree with Appellants that such a comparison reflects the closest prior art, but this single comparison is not commensurate-in-scope with the claims. The claims encompass many other monomers and Appellants provide no evidence that the results would be similar for the other monomers. Furthermore, Appellants have not convinced us that the differences in heat durability and other properties discussed in the Brief and Reply Brief would not have been expected by one of ordinary skill in the art. There is no statement in the specification that the variations would have been unexpected. Moreover, as evidenced by Tomoi, heat durability was known to be improved with the use of the monomers in which n is from 3 to 18, i.e., “A” is a C<sub>3-18</sub> group.

***Remand to the Examiner***

We also remand this application to the Examiner to consider a rejection including MacDonald and Tomoi as evidence of unpatentability with regard to the product claims 1-4, 11, and 12. As discussed in regard to the process claims, the evidence supports the finding that there is a suggestion to use the precursor monomer of Tomoi (col. 5, ll. 28-45) in the method of MacDonald (col. 8, ll. 5-24 referencing col. 7, ll. 42-47) to make an anion selective membrane

that has improved heat durability (Tomoi, col. 3, ll. 8-51). With respect to claim 1, it would appear that the substantially uniform structure required due to the “mixing substantially uniformly” limitation would be inherently present in the product resulting from the process of MacDonald because MacDonald mixes the functional monomer with the thermoplastic polymer having no ion exchange groups just as done by Appellants. The reasonableness of this conclusion lies in the identity of the process conditions used to form the claimed and prior art products and of the other shared properties of these products. Under these circumstances, it is eminently fair and acceptable to shift the burden to Appellants and require them to prove that the subject matter shown to be in the prior art does not, in fact, possess the properties they are relying upon for patentability. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 432-33 (CCPA 1977).

The Examiner should determine the patentability of all the claims in light of the above analysis applying additional evidence of unpatentability as needed.

### ***CONCLUSION***

To summarize, the decision of the Examiner to reject claims 1-12 under 35 U.S.C. § 103(a) is affirmed-in-part and the application remanded to the Examiner for further consideration of a new ground of rejection.

In addition to affirming the examiner's rejection of one or more claims, this decision contains a remand. 37 CFR § 41.50(e) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)) provides that

[w]henver a decision of the Board includes a remand, that decision shall not be considered final for judicial review. When appropriate, upon conclusion of proceedings on remand before the examiner, the Board may enter an order otherwise making its decision final for judicial review.

Regarding any affirmed rejection, 37 CFR § 41.52(a)(1) provides "[a]ppellant may file a single request for rehearing within two months from the date of the original decision of the Board."

The effective date of the affirmance is deferred until conclusion of the proceedings before the examiner unless, as a mere incident to the limited proceedings, the affirmed rejection is overcome. If the proceedings before the examiner do not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejections, including any timely request for rehearing thereof.

This remand to the examiner pursuant to 37 CFR § 41.50(a)(1) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)) is **NOT** made for further consideration of a rejection. Accordingly, 37 CFR § 41.50(a)(2) does not apply.

AFFIRMED-IN-PART

and

REMANDED

BRADLEY R. GARRIS  
Administrative Patent Judge

CHARLES F. WARREN  
Administrative Patent Judge

CATHERINE TIMM  
Administrative Patent Judge

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