

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

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARTIN ROTH, ROGER SALVIN, KURT MEIER,
BERNHARD SAILER, and ROLF WIESENDANGER

Appeal No. 1997-3036
Application 08/268,094

ON BRIEF

Before OWENS, LIEBERMAN, and TIERNEY, Administrative Patent Judges.
TIERNEY, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. §134 from the examiner's refusal to allow claims 2 through 4, 7 and 10 through 11, as amended in the amendment after final (see the amendment filed November 16, 1995, Paper No. 11, entered as per the Advisory Action mailed December 1,

Appeal No. 1997-3036
Application No. 08/268,094

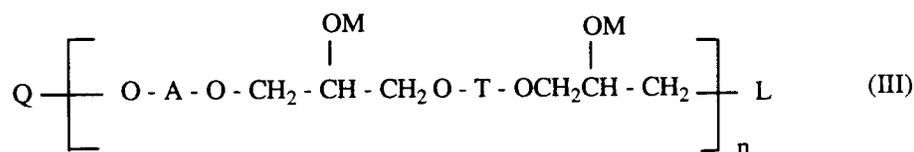
1995, Paper No. 12). These are the only claims pending in this application.

We Reverse.

The Invention

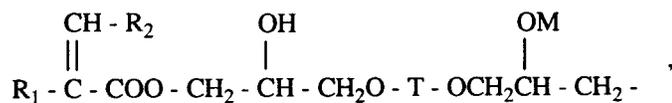
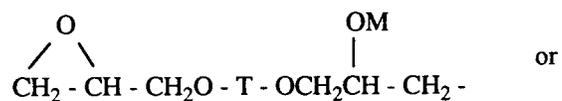
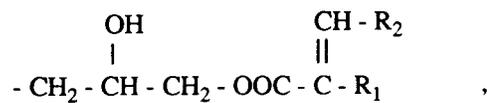
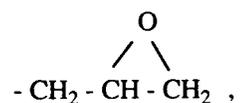
The appellants' invention relates to an epoxy acrylate for use in photoresist formulations. (Specification, p. 1). A copy of the claims under appeal is set forth in the appendix to the appellants' brief. Claim 11, the only pending independent claim, is illustrative of the invention. As shown in claim 11, when n is 0 in the epoxy acrylate of formula III the formula is reduced to Q-L where Q is hydrogen and L possesses an acrylate end group. When n ranges from 1 to 300 in the epoxy acrylate of formula III, Q and L may independently possess glycidyl or acrylate end groups and the epoxy acrylate possesses side radicals M where at least 10 mol% of the radicals M that are not present in the end groups Q and L denote an acrylate moiety. Claim 11 reads as follows:

11. (New) An epoxy acrylate of formula (III) for use in photoresist formulations



wherein

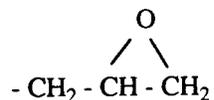
Q is a hydrogen or a group of formula



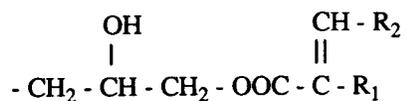
R₁ is -H or -CH₃, R₂ -H, -CH₃ or phenyl
 T is the radical of an aromatic bifunctional compound, and
 M is each independently hydrogen or a group of formula

Appeal No. 1997-3036
 Application No. 08/268,094

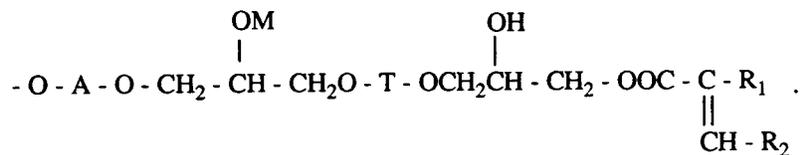
with the proviso that in formula III not all radicals M may be simultaneously hydrogen or a group of formula



but at least 10 mol% of the radicals M that are not present in the end groups Q and L denote a group of the formula



wherein R₁ and R₂ are as defined above, and with the proviso that if n in formula III is 0, then Q is -H and L is the group of formula



Appeal No. 1997-3036
Application No. 08/268,094

The References

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Fekete et al. (Fekete)	3,373,075	Mar. 12, 1968
Takiyama et al. (Takiyama)	3,676,524	Jul. 11, 1972
Green	4,074,008	Feb. 14, 1978
Kajiwara et al. (Kajiwara)	5,218,061	Jun. 8, 1993

The Rejections

Claims 2-4, 7 and 10-11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fekete or Takiyama in view of Green or Kajiwara.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the answer (Paper No. 19, mailed January 9, 1997) and the supplemental answer (Paper No. 21, mailed June 4, 1997) for the examiner's complete reasoning in support of the rejections, and to the brief (Paper No. 16, filed August 13, 1996) and reply brief (Paper No. 20, filed March 5, 1997) for the appellants' arguments thereagainst.

Opinion

We have carefully considered all of the arguments advanced by appellants and the examiner and agree with appellants that the aforementioned rejections are not well founded.

Appeal No. 1997-3036
Application No. 08/268,094

Accordingly, we reverse these rejections.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See *In re Royka*, 490 F.2d 981, 180 USPQ 580, 583 (CCPA 1974). Furthermore, the motivation to modify the prior art references must flow from some teaching in the art that suggests the desirability or incentive to make the modification needed to arrive at the claimed invention. *In re Napier*, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995). Specifically, obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the claimed combination. *In re Geiger*, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987).

As discussed in detail below, the relied upon prior art fails to teach or suggest appellants' claimed epoxy acrylates of formula III where Q is hydrogen and L possesses an acrylate end group or where the epoxy acrylate possesses side radicals M where at least 10 mol% of the radicals M that are not present in the end groups Q and L denote an acrylate moiety. Specifically, none of the references, Fekete, Takiyama, Green, Kajiwara, alone or in combination teach or suggest an epoxy acrylate of formula III with acrylate side radicals M or an epoxy acrylate with one acrylate end group and one aromatic bifunctional compound having an -OH radical as the other end group.

The Primary References

The Fekete Reference

Fekete discloses thermoset resin compositions having heat resistant polymers and methods of making electrical laminates therefrom. In Fekete, the thermoset resin is a diacrylate polymer formed from the reaction of a diglycidyl ether or polyglycidyl ether of Bisphenol-A with two moles of a carboxylic acid selected from the class of acrylic, methacrylic and ethylacrylic acid. (*Fekete.*, col. 1, lines 45-59). According to Fekete the reaction between the polyglycidyl ethers of Bisphenol-A and the carboxylic acid proceeds until substantially all of the epoxy groups are eliminated. (*Fekete*, col. 1, line 66 to col. 2, line 5). As recognized by the examiner, Fekete does not disclose appellants' claimed epoxy acrylate as the diacrylate of Fekete is a fully acrylated Bisphenol-A epoxide with no pendant acrylate moieties. Teaching only the fully acrylated diacrylates, Fekete could not have rendered obvious, appellants' claimed epoxy acrylates.

The Takiyama Reference

Takiyama relates to a process for producing unsaturated ester resins where an epoxy resin having at least one epoxy group in its molecular structure is heat reacted with an unsaturated monobasic acid in the presence of a catalyst. (*Takiyama*, abstract). The epoxy compounds which may be used include diglycidyl ethers such as bisphenol type epoxy resins and epoxy novalac resins. (*Takiyama.*, col. 3, lines 16-33). Suitable unsaturated monobasic acids include

methacrylic acid and acrylic acid. (*Takiyama*, col. 3, lines 34-39). In carrying out the reaction, the epoxy compounds and the acid are used in such amounts that the total carboxyl groups of the acid is at least 0.1 mol to each mol of the epoxy group of the epoxy compound, preferably the total carboxyl groups range from 0.2 to 1.2 moles per epoxy group. (*Takiyama*, col. 4, lines 23-33). Accordingly, Takiyama disclose the formation of both partial and fully acrylated epoxy compounds. Yet, as with Fekete, Takiyama fails to disclose appellants' claimed epoxy acrylates of formula (III) with acrylate side radicals M or an epoxy acrylate of formula (III) with one acrylate end group and one aromatic bifunctional compound having an -OH radical as the other end group. Consequently, Takiyama fails to provide the requisite motivation or suggestion necessary for the person skilled in the art to modify the disclosed unsaturated ester resins and form appellants' claimed epoxy acrylate.

Secondary References

The Green Reference

Green teaches novel epoxide resins for use in the preparation of printing plates and printed circuits. (Green, col. 12, lines 8-18). Green's epoxide resins are capable of polymerization on exposure to actinic radiation and have, per average molecule, at least two photopolymerizable groups and also at least two 1, 2-epoxide groups. (Green, abstract). To improve the adhesion of the epoxide resins, Green teaches that the epoxide resins contain a glycidyl ether group attached to a secondary carbon atom. (Green, col. 1, line 60 to col. 2, line

20). One class of preferred epoxide resins includes acrylate photopolymerizable groups. (Green, col. 2, lines 31-46). The acrylate photopolymerizable group can be a repeating unit with pendant side chains -OX where X represents a hydrogen atom or a glycidyl group such that at least one group X is a glycidyl group. Indeed, in a preferred embodiment the preferred epoxide resins contain 3 to 10 of the acrylate photopolymerizable groups each having a pendant glycidyl group. (Green, col. 3, lines 12-36). One preferred subclass of epoxide resins includes those of Formula XXIV where the epoxide resin possesses two glycidyl end groups and one or more pendant glycidyl groups. Yet another preferred subclass of Green's epoxide resins is depicted in Formula XXIX where a partially postglycidylated epoxy resin is shown to possess acrylate end groups. (Green, col. 6). Green, however, fails to disclose the reaction of an ethylenically unsaturated monocarboxylic acid with the postglycidylated epoxy resins to form an epoxy acrylate having pendant acrylate groups such as that described by appellants' claim 11, formula III. Failing to teach the formation of pendant acrylate groups, Green, as a secondary refernece, could not have motivated one skilled in the art to modify the resins of Takiyama or Fekete to form appellants' claimed epoxy acrylates with pendant acrylate moieties or appellants' claimed epoxy acrylate of formula III when n is 0, Q is hydrogen and L possesses an acrylate end group.

The Kajiwara Reference

Kajiwara relates to polyfunctional epoxy resins having two phenolic glycidyl ether groups, one or more alcoholic glycidyl ether groups and one or more alcoholic hydroxyl groups.

Kajiwara teaches that partially post-glycidylated epoxy resins can be formed by epoxidizing phenolic hydroxyl groups and pendant alcoholic hydroxyl groups. (Kajiwara, col. 1, line 51 to col. 2, line 21). The partially post-glycidylated epoxy resins are described as having excellent heat resistance and toughness and the cured epoxy resin product is mentioned as extremely useful in a wide variety of products, such as photoresists. (Kajiwara, abstract). Nevertheless, Kajiwara fails to describe or suggest the presence of acrylate groups, let alone pendant acrylate groups, on the partially post-glycidylated epoxy resins. Failing to mention the presence of acrylate groups, Kajiwara simply does not disclose or suggest appellants' claimed epoxy acrylates.

The References Taken as a Whole

The Examiner submits that it would have been obvious to use the composition of Fekete or Takiyama and replace their conventional epoxides with the post-glycidylated epoxides of Green or Kajiwara as the secondary references disclose that their post-glycidylated epoxides possess improved properties. The examiner also contends that an acrylated epoxide is merely an epoxy resin with altered functional groups, wherein the matrix of the system is not changed.

As discussed above, the primary references Fekete and Takiyama relate to epoxides formed from glycidyl ethers where the glycidyl groups are present only at the ends of their respective compounds. Neither Fekete nor Takiyama contemplate the employment of a glycidyl ether compound having pendant glycidyl ether moieties. Similarly, the secondary references, Green and Kajiwara, fail to mention or suggest that post-glycidylated epoxides may be reacted

with an acrylic acid after glycidylation such that pendant acrylate moieties may be present in their epoxide resins.

The examiner cites Green and Kajiwara's as teaching their post-glycidylated epoxides as possessing improved properties over conventional epoxides. Yet, Green and Kajiwara's statements do not provide basis for the assumption that one skilled in the art would believe that acrylating post-glycidylated epoxides would also possess the improved properties. Such reasoning that one skilled in the art, provided with the primary and secondary references, would readily recognize the benefits of acrylating the post-glycidylated epoxides is selective hindsight which is no more applicable to the design of experiments than it is to the combination of the prior art teachings. See *In re Dow Chemical Co.*, 837 F.2d 469, 471, 5 USPQ2d 1529, 1530 (Fed. Cir. 1988).

The mere fact that the references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990). Yet, Fekete, Takiyama, Green or Kajiwara, alone or in combination, do not teach or suggest the desirability of making appellants' claimed epoxy acrylate. Accordingly, upon careful review of the record and the references themselves, it is apparent that the examiner has failed to support their burden of establishing a *prima facie* conclusion of obviousness.

Appeal No. 1997-3036
Application No. 08/268,094

Observation

In the event of further prosecution of this application, we note that claim 4 recites that "A, T, and n are as defined in claim 1." Claim 1 was canceled by appellants with the Amendment Under Rule 115 filed December 6, 1994. As such, claim 4 refers to a canceled claim for the definition of variables A, T and n. This discrepancy should be resolved upon further prosecution.

Conclusion

To summarize, the decision of the examiner to reject claims 2-4, 7 and 10-11 under 35 U.S.C. § 103(a) over Fekete or Takiyama in view of Green or Kajiwara is Reversed.

REVERSED

TERRY J. OWENS)
Administrative Patent Judge)
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)
) BOARD OF PATENT
PAUL LIEBERMAN)
Administrative Patent Judge) APPEALS AND
)
) INTERFERENCES
)
MICHAEL P. TIERNEY)
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Appeal No. 1997-3036
Application No. 08/268,094

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