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Elevance Renewable Sciences, Inc. (Main) Kilpatrick Townsend & Stockton LLP 1100 Peachtree St. NE Suite 2800 Atlanta, GA 30309			KEYS, ROSALYND ANN	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TIMOTHY W. ABRAHAM, HIROKI HAIDO, CHOON WOO
LEE, RICHARD L. PEDERSON, YANN SCHRODI, and MICHAEL
JOHN TUPY

Appeal 2019-003610
Application 14/678,749
Technology Center 1600

Before JOHN E. SCHNEIDER, RYAN H. FLAX, and
CYNTHIA M. HARDMAN, *Administrative Patent Judges*.

SCHNEIDER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the
Examiner's decision to reject claims 91–102 and 107. We have jurisdiction
under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R.
§ 1.42(a). Appellant identifies the real party in interest as Elevance
Renewable Sciences, Inc. Appeal Br. 3.

CLAIMED SUBJECT MATTER

The claims are directed to methods for making organic compounds by metathesis. Claim 91, reproduced below, is illustrative of the claimed subject matter:

91. A method comprising:
- providing (a) a starting material comprising unsaturated fatty acid triglycerides and (b) short-chain alpha-olefins;
 - cross-metathesizing the unsaturated fatty acid triglycerides of the starting material and the short-chain alpha-olefins in the presence of a metathesis catalyst to provide cross-metathesis products comprising olefins and ester-functionalized alkenes, wherein the ester-functionalized alkenes comprise unsaturated fatty acid triglycerides;
 - separating the olefins in the cross-metathesis products and the ester-functionalized alkenes in the cross-metathesis products to provide separated olefins and separated ester-functionalized alkenes, wherein the separated ester-functionalized alkenes comprise unsaturated fatty acid triglycerides; and
 - transesterifying the separated ester-functionalized alkenes in the presence of an alcohol to provide a transesterified product comprising glycerol and free ester-functionalized alkenes.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Lysenko et al.	US2005/0154221 A1	July 14, 2005
J.C. Mol, <i>Metathesis of unsaturated fatty acid esters and fatty oils</i> , 90 J. Mol. Cat. 185 (1994)		
Patel et al., <i>High conversion and productive catalyst turnovers in cross-metathesis reactions of Natural oils with 2-butene</i> , 8 Green Chem. 450 (2006)		

REJECTIONS

The Examiner has rejected the pending claims as follows:

Claims 91–93, 96–98, and 107 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Lysenko.

Claims 91–102 and 107 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Mol in view of Lysenko and Patel.

Claims 91–99 and 107 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Lysenko in view of Mol and Patel.

OBVIOUSNESS BASED ON LYSENKO

Issue

The issue with respect to this rejection is whether a preponderance of the evidence supports the Examiner’s conclusion that the subject matter of claims 91–93, 96–98, and 107 would have been obvious to one of ordinary skill in the art at the time the invention was made over the teachings of Lysenko.

The Examiner finds that Lysenko teaches a process whereby a fatty acid ester feedstock is metathesized with a lower olefin using a metathesis catalyst to produce a mixture comprising a reduced chain olefin and a reduced chain fatty ester. Final Act. 9. The Examiner finds that Lysenko teaches that the mixture can be separated by conventional methods and the reduced chain unsaturated esters can be transesterified with a polyol such as glycerol. *Id.* The Examiner finds that Lysenko teaches that the feedstock may comprise plant and vegetable oils such as “castor, olive, peanut, rapeseed, corn, sesame, cottonseed, soybean, sunflower, canola, safflower, linseed, and the like,” and the olefins can include C₂ to C₅ olefins including alpha-olefins. *Id.*

Appellant contends that Lysenko does not teach or suggest the direct cross-metathesis of an unsaturated fatty acid triglyceride with a short chain alpha-olefin. Appeal Br. 9. Appellant contends that paragraph 14 of Lysenko only refers to unsaturated fatty acid esters and that paragraph 50 of the reference discourages the use of unsaturated triglycerides. *Id.*

Appellant also contends that Lysenko does not teach or suggest transesterification of a glyceride ester to yield glycerol as a product. *Id.* Appellant contends that Lysenko teaches the opposite reaction, namely the reaction of a lower alkyl ester with glycerol to produce a glyceride ester and a lower alkanol product. *Id.* at 10.

Legal Principles

“[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

A prima facie case for obviousness “requires a suggestion of all limitations in a claim,” *CFMT, Inc. v. Yieldup Int’l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003), and “a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Analysis

We have considered the arguments advanced by both the Examiner and Appellant and conclude that the Appellant has the better position. We agree with the Appellant that the Examiner has not established that Lysenko teaches a transesterification step which results in “a transesterified product comprising glycerol and free ester-functionalized alkenes.” Appeal Br. 14.

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Lysenko teaches the use of glycerol as a reactant to esterify a lower alkyl ester to produce a glyceride ester and a lower alkanol product. Lysenko ¶ 80.

The Examiner contends that since the reaction mixture includes glycerol, there is likely some glycerol remaining in the final product, thus meeting the requirement that the product include glycerol. Ans. 10. We are not persuaded by this argument.

As Appellant points out, the Examiner's argument appears to be based on inherency. Reply Br. 4. To establish inherency, the Examiner must show that glycerol is necessarily present in the finished product, not that it might be present. *In re Montgomery*, 677 F.3d 1375, 1379–80 (Fed. Cir. 2012). Here the Examiner has not offered any evidence that glycerol is necessarily present in the final product. In fact, Lysenko teaches that an excess amount of the ester is used in the reaction and the lower alkanol is removed from the reaction to drive the reaction forward. Lysenko ¶ 80. This supports the conclusion that the final product does not contain any unreacted glycerol. Reply Br. 4.

Conclusion

Based on the foregoing, we conclude that a preponderance of the evidence does not support the Examiner's conclusion that claims 91–93, 96–98, and 107 would have been obvious to one of ordinary skill in the art at the time the invention was made over the teachings of Lysenko.

OBVIOUSNESS BASED ON MOL, LYSENKO, AND PATEL *Issue*

The issue with respect to this rejection is whether a preponderance of the evidence supports the Examiner's conclusion that the subject matter of claims 91–102 and 107 would have been obvious of one of ordinary skill in

the art at time the invention was made over Mol combined with Lysenko and Patel.

The Examiner finds that Mol teaches a method whereby vegetable oils are cross-metathesized with lower olefins. Final Act. 7. The Examiner finds that Mol does not teach or suggest the use of a short chain alpha-olefin, but that the element is taught by Lysenko. *Id.* at 8. The Examiner also finds that Mol does not teach the additional steps of separating the olefins from the ester-functionalized alkenes followed by transesterification of the ester-functionalized alkenes, but that those steps are taught by Patel. *Id.*

Appellant contends that the Examiner has failed to set forth any reason why one skilled in the art would have modified the process of Mol to incorporate the teachings of Lysenko and Patel to arrive at the claimed invention. Appeal Br. 10. Appellant contends that the Examiner has not explained why one skilled in the art would use the lower alpha olefins of Lysenko when one example does not use an olefin as a reactant and another uses internal olefins not alpha olefins. *Id.* at 10–11. Appellant contends that for the one example which uses an alpha olefin, there is no teaching or suggestion to transesterify the product of the metathesis reaction. *Id.* Appellant contends that the modifications proposed by the Examiner would result in significantly less product than the method recited in Mol or would result in a completely different product. *Id.*

Legal Principles

“Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination.” *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). “Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have

selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

Analysis

We have considered the arguments advanced by both the Examiner and Appellant and conclude that Appellant has the better position. While the individual elements of the claims may appear in the individual references, we discern no motivation to combine the references in the manner suggested by the Examiner. Specifically the Examiner has not convincingly explained why one skilled in the art would use a lower alpha olefin in the first and third processes taught by Mol, nor has the Examiner explained why one skilled in the art would subject the product of the second reaction described in Mol to transesterification such that an ester-functionalized alkene and glycerol are produced.

The Examiner argues that both Lysenko and Mol teach that transesterification can be performed on the products of metathesis and that Patel teaches that transesterification can be used to liberate fatty acids and esters including those produced in Mol. Ans. 12–13. While this may be true, those teachings only show that the transesterification step is possible and what the result might be. The Examiner does not explain why one skilled in the art would want to transesterify the products produce in Mol or why the resulting products might be desirable.

Conclusion

We conclude that a preponderance of the evidence does not support the Examiner’s conclusion that the subject matter of claims 91–102 and 107 would have been obvious of one of ordinary skill in the art at time the invention was made over Mol combined with Lysenko and Patel.

OBVIOUSNESS BASED ON LYSENKO, MOL, AND PATEL

Issue

The issue with respect to this rejection is whether a preponderance of the evidence supports the Examiner's conclusion that the subject matter of claims 91–99 and 107 would have been obvious to one skilled in the art at the time the invention was made over Lysenko combined with Mol and Patel.

The Examiner finds that Lysenko teaches a process wherein a fatty acid ester feedstock is metathesized with a lower olefin to produce a reduced chain olefin and reduced chain unsaturated fatty ester. Final Act. 9. The Examiner finds that Lysenko also teaches that the metathesis products can be separated and the reduced chain unsaturated esters can be esterified. *Id.* The Examiner finds that while Lysenko does not specifically teach the use of an unsaturated fatty acid triglyceride as a feedstock, Lysenko teaches that the feedstock can be any fatty acid or fatty acid ester feedstock “provided that the unsaturated fatty acids or unsaturated fatty acid esters contained therein can be metathesized to form reduced chain olefins and reduced chain unsaturated acids or esters.” *Id.* at 10 (quoting Lysenko ¶ 53). The Examiner finds that Patel and Mol teach the cross-metathesis of triglycerides with lower olefins for produce reduced chain olefins and reduced chain unsaturated acids and esters. *Id.*

The Examiner concludes

One having ordinary skill in the art at the time the invention was made would have found it obvious that an unsaturated fatty acid triglyceride, such as disclosed by Patel et al. and J. C. Mol could be cross-metathesized in the process of Lysenko et al., since Patel et al. and J.C. Mol have shown that triglycerides derived from natural oils can be cross-metathesized with lower olefins to form reduced chain olefins

and reduced chain unsaturated acids and esters and Lysenko et al. disclose that any fatty acid ester feedstock can be suitably employed in the metathesis provided that the unsaturated fatty acids contained therein can be metathesized to form reduced chain olefins and reduced chain unsaturated esters.

Id.

Appellant contends that the Examiner has not provided an adequate motivation to combine the references. Appeal Br. 11. Appellant contends that Lysenko does not teach or suggest the use of unsaturated triglycerides as a reactant and in fact teaches away from using triglycerides as reactants. *Id.* at 12. Appellant contends that neither Mol nor Patel cure this deficiency of Lysenko. *Id.* at 11–12.

Analysis

We have considered the arguments advanced by the Examiner and Appellant and conclude that the Examiner has not established that the subject matter of the claims would have been obvious over Lysenko combined with Mol and Patel.

In making this rejection, the Examiner relies on Lysenko for the transesterification step. Final Act. 10. However, as discussed above, the transesterification step in Lysenko does not yield glycerol as a reaction product. *See* Lysenko ¶ 80. The Examiner has not pointed to, nor have we discerned any teaching in Mol or Patel of, a transesterification step which yields a product comprising glycerol and free ester-functionalized alkenes.

Conclusion

We conclude that a preponderance of the evidence does not support the Examiner's conclusion that claims 91–99 and 107 would have been obvious to one skilled in the art at the time the invention was made over Lysenko combined with Mol and Patel.

CONCLUSION

The Examiner's rejections under 35 U.S.C. §103(a) are reversed.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
91-93, 96-98, 107	103(a)	Lysenko		91-93, 96-98, 107
91-102, 107	103(a)	Mol, Lysenko, Patel		91-102, 107
91-99, 107	103(a)	Lysenko, Mol, Patel		91-99, 107
Overall Outcome				91-102, 107

REVERSED