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- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

[Continued on next page]

(54) **Title:** SYNTHESIS OF DIESTER-BASED LUBRICANTS FROM ENZYMATICALLY-DIRECTED EPOXIDES

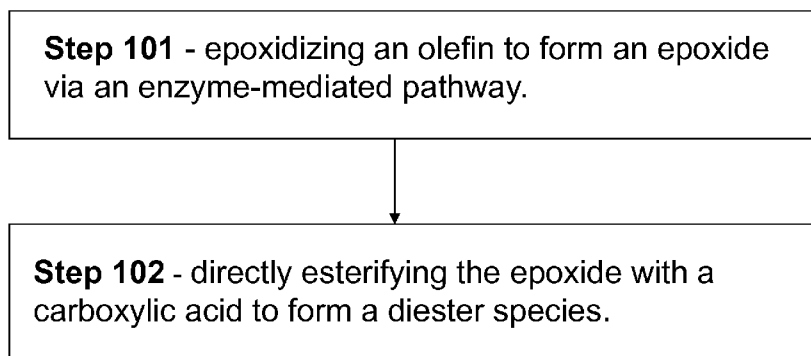


Fig. 1

(57) **Abstract:** The present invention is generally directed to methods of making diester-based lubricant compositions, wherein formation of diester species proceeds via esterification of epoxide intermediates, and wherein the epoxide intermediates are generated via an enzymatically-driven mechanism. In some embodiments, the methods for making such diester-based lubricants utilize a biomass precursor and/or low value (e.g., Fischer-Tropsch (FT) olefins and/or alcohols) so as to produce high value diester-based lubricants. In some embodiments, such diester-based lubricants are derived from FT olefins and fatty acids. The fatty acids can be from a bio-based source (i.e., biomass, renewable source) or can be derived from FT alcohols via oxidation.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/064170**A. CLASSIFICATION OF SUBJECT MATTER*****C10M 105/36(2006.01)i, C10M 105/32(2006.01)i, C12P 7/40(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C10M 105/36; C08G 63/02; C12N 9/20; C12P 7/64

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: ester-based lubricant,diester,epoxidizing,enzyme

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006-0014921 A1 (MIHARA et al.) 19 January 2006 See the abstract, paragraph [24] - paragraph [051], whole claims	1-20
A	US 2005-0176118 A1 (JOHN OAKESHOTT et al.) 11 August 2005 See the abstract, paragraph [24] - paragraph [240]	1-20
A	US 2006-0079662 A1 (FUKUI et al.) 13 April 2006 See the whole document	1-20

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

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