

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(51) International Patent Classification <sup>7</sup> :</b><br><b>C01B 39/02, B01J 29/65, 29/66</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 00/53530</b><br><b>(43) International Publication Date:</b> 14 September 2000 (14.09.00)                                                                                                                                                                                    |
| <b>(21) International Application Number:</b> PCT/US99/02283<br><b>(22) International Filing Date:</b> 5 March 1999 (05.03.99)<br><br><b>(71) Applicant:</b> EXXON RESEARCH AND ENGINEERING COMPANY [US/US]; 180 Park Avenue, P.O. Box 390, Florham Park, NY 07932-0390 (US).<br><br><b>(72) Inventors:</b> JOHNSON, Jack, Wayne; 9 Sunrise Circle, Clinton, NJ 08809 (US). COOK, Bruce, Randall; 2 Capoolong Creek Road, Pittstown, NJ 08867 (US). CAO, Guang; 528 Woodside Lane, Branchburg, NJ 08876 (US). McEVOY, Richard, Arthur; 1103 Bridgeton Hill Road, Upper Black Eddy, PA 18972 (US). ERNST, Richard, Harry; 125 Hockenbury Drive, Glen Gardner, NJ 08826-3520 (US).<br><br><b>(74) Agents:</b> SIMON, Jay et al.; Exxon Research and Engineering Company, P.O. Box 390, Florham Park, NJ 07932-0390 (US).                                                                                                                                                                                                                                              |           | <b>(81) Designated States:</b> AU, BR, CA, CN, JP, NO, SG, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).<br><br><b>Published</b><br><i>With international search report.</i><br><br><br>*G00001* |
| <b>(54) Title:</b> RARE EARTH METAL ION EXCHANGED FERRIERITE<br><br><b>(57) Abstract</b><br><br>Ferrierite is ion exchange with trivalent rare earth metals by a hydrothermal ion exchange method. The ion exchange is carried out by contacting ferrierite, in which its cation exchange positions are occupied by hydrogen or a hydrogen precursor, with an aqueous solution of one or more rare earth metal cations at a temperature above the boiling point of the solution. After the ion exchange, preferably at least 10 % and more preferably at least 15 % of the ferrierite cation exchange capacity is occupied by a trivalent rare earth metal cation. When combined with a catalytic metal, such as a Group VIII noble metal, the trivalent rare earth metal ion exchange ferrierite is useful as a dewaxing catalyst having good selectivity for lubricating oil fractions, particularly when dewaxing a Fischer-Tropsch wax hydroisomerate.<br><br><br>*162162* |           |                                                                                                                                                                                                                                                                                                                                 |