

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
11 January 2024 (11.01.2024)



(10) International Publication Number
WO 2024/011044 A1

(51) International Patent Classification:

C01B 39/02 (2006.01) C10G 47/16 (2006.01)
C01B 39/06 (2006.01) C10G 47/20 (2006.01)
C01B 39/20 (2006.01)

(21) International Application Number:

PCT/US2023/069235

(22) International Filing Date:

28 June 2023 (28.06.2023)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

17/857,447 05 July 2022 (05.07.2022) US
18/151,892 09 January 2023 (09.01.2023) US

(71) Applicants: SAUDI ARABIAN OIL COMPANY
[SA/SA]; 1 Eastern Avenue, Dhahran, 31311 (SA).
KING ABDULLAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY [SA/SA]; 4700 King Abdullah University
of Science and Technology, Thuwal, 23955-6900 (SA).

(71) Applicant (for US only): ARAMCO SERVICES COM-
PANY [US/US]; 1200 Smith Street, Two Allen Building,
Houston, Texas 77002 (US).

(72) Inventors: PARSAPUR, Rajesh Kumar; c/o King Ab-
dullah University of Science and Technology, 4700 King
Abdullah University of Science and Technology, Thuw-
al, 23955-6900 (SA). HODGKINS, Robert Peter; c/o
Saudi Arabian Oil Company, 1 Eastern Avenue, Dhahran,
31311 (SA). KOSEOGLU, Omer Refa; c/o Saudi Ara-
bian Oil Company, 1 Eastern Avenue, Dhahran, 31311
(SA). HUANG, Kuo-Wei; c/o King Abdullah University of
Science and Technology, 4700 King Abdullah University of
Science and Technology, Thuwal, 23955-6900 (SA). SED-
JERARI, Anissa Bendjeriou; c/o King Abdullah Universi-
ty of Science and Technology, 4700 King Abdullah Univer-
sity of Science and Technology, Thuwal, 23955-6900 (SA).

(74) Agent: CRISPINO, Ralph J. et al.; One Barker Avenue,
Fifth Floor, White Plains, New York 10601 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,

KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,
NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO,
RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, CV,
GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST,
SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ,
RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ,
DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT,
LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE,
SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- 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))

(54) Title: HIERARCHICALLY ORDERED CRYSTALLINE MICROPOROUS MATERIALS WITH LONG-RANGE MESO-
POROUS ORDER HAVING CUBIC SYMMETRY

(57) Abstract: A composition of matter is provided comprising hierarchically ordered crystalline microporous material having well-
defined long-range mesoporous ordering of cubic symmetry. The composition possesses mesopores having walls of crystalline micro-
porous material and a mass of mesostructure between mesopores of crystalline microporous material. Long-range ordering is defined
by presence of secondary peaks in an X-ray diffraction (XRD) pattern and/or cubic symmetry observable by microscopy.

WO 2024/011044 A1