

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
04 August 2022 (04.08.2022)



(10) International Publication Number
WO 2022/164716 A1

(51) International Patent Classification:

C08F 212/08 (2006.01) C08F 232/08 (2006.01)
C08F 212/12 (2006.01) C09J 7/38 (2018.01)
C08F 232/06 (2006.01) C09J 125/08 (2006.01)

(21) International Application Number:

PCT/US2022/013226

(22) International Filing Date:

21 January 2022 (21.01.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/141,681 26 January 2021 (26.01.2021) US

(71) Applicant: **EXXONMOBIL CHEMICAL PATENTS INC.** [US/US]; 5200 Bayway Drive, Baytown, TX 77520 (US).

(72) Inventors: **TRIPATHY, Ranjan**; 5639 Whisper Ridge Drive, Sugar Land, TX 77479 (US). **RAJA, Rajesh P.**; 619 Rollingbrook Street, Apt. 2505, Baytown, TX 77521 (US). **GEORJON, Olivier Jean Francois**; Avenue Prince De Ligne, 60, 1180 Uccle (BE). **COPEY, Laurent**; Manufacture Francaise Des Pneumatiques Michelin, Dgd/pi-F35 - Ladoux, 63040 Clermont Ferrand Cedex 9 (FR). **BONNETTE, Fabien**; Manufacture Francaise Des Pneumatiques Michelin, Dgd/pi - F35 - Ladoux, 63040 Clermont Ferrand Cedex 9 (FR).

(74) Agent: **JACKSON, Katherine L.** et al.; Exxonmobil Chemical Company, Law Technology, P. O. Box 2149, Baytown, TX 77522-2149 (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, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, 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, GH, GM, KE, LR, LS, MW, MZ, NA, RW, 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, 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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

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

(54) Title: HYDROCARBON POLYMER MODIFIERS HAVING HIGH AROMATICITY AND LOW MOLECULAR WEIGHT AND USES THEREOF

(57) Abstract: Described herein are hydrocarbon polymer modifiers for use in various applications. The hydrocarbon polymer modifier comprises a cyclic component, and has a glass transition temperature and Mn defined by the following two equations: (1) $T_g \geq 95 - 2.2 * (\%H \text{ Ar})$, and (2) $T_g \geq -53 + (0.265 * Mn)$; an aromatic proton content (%H Ar) of from 12 mole % to 19 mole %; and an Mn of from 300 g/mole to 450 g/mole, wherein T_g is glass transition temperature as expressed in °C of the modifier, the %H Ar represents the content of aromatic protons in the hydrocarbon polymer modifier, Mn represents the number average molecular weight of the hydrocarbon polymer modifier, and the cyclic component is selected from the group of a distillation cut from a petroleum refinery stream, and/or C₄, C₅ or C₆ cyclic olefins and mixtures thereof. Further, the hydrocarbon polymer modifier may be characterized by a T_g of from 70 °C to 95 °C and/or a z-average molecular weight (Mz) of the hydrocarbon polymer modifier of less than 1000 g/mole. The hydrocarbon modifiers are particularly useful in high T_g applications where low molecular weight resin is desirable.

WO 2022/164716 A1