

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
02 September 2021 (02.09.2021)



(10) International Publication Number
WO 2021/173345 A1

(51) **International Patent Classification:**
C07F 7/08 (2006.01) *C08F 4/659* (2006.01)
(21) **International Application Number:**
PCT/US2021/017386
(22) **International Filing Date:**
10 February 2021 (10.02.2021)
(25) **Filing Language:** English
(26) **Publication Language:** English
(30) **Priority Data:**
62/980,655 24 February 2020 (24.02.2020) US

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).

Published:

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

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(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,

(54) **Title:** NON-CRYOGENIC SYNTHESIS OF HETEROATOM-BRIDGE PRECURSORS OF METAL-LIGAND COMPLEX CATALYSTS

(57) **Abstract:** Embodiments are directed to a metal-ligand complex catalyst precursor, $(L^1)(L^2)X(R^1)(R^2)$, and methods for producing the same from a compound of formula $Q_2X(R^1)(R^2)$. L^1 and L^2 are independently $-R^3-Z^1$ or $-R^4-Z^1$. R^1 and R^2 are independently selected from a hydrogen atom, (C_1-C_{40}) hydrocarbyl and, optionally, R^1 and R^2 are connected to form a ring having from 3 to 50 atoms in the ring, excluding hydrogen atoms. X is Si, Ge, Sn, or Pb. Each Q is independently $Ar^1-Y^1R^3$ - or $Ar^2-Y^2-R^4$ -. R^3 and R^4 are independently selected from $-(CR^C_2)_m$ -, where m is 1 or 2, and where each R^C is independently selected from the group consisting of (C_1-C_{40}) hydrocarbyl, (C_1-C_{40}) heterohydrocarbyl, and -H. Y^1 and Y^2 are independently S, Se, or Te. Ar^1 and Ar^2 are independently (C_6-C_{50}) aryl. $Ar^1-Y^1-R^3$ - and $Ar^2-Y^2-R^4$ - are not identical. Each Z^1 is independently selected from Cl, Br, and I.



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