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63/188,667 14 May 2021 (14.05.2021) US(71) Applicants: **EXXONMOBIL CHEMICAL PATENTS INC.** [US/US]; 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **CHEVRON ORONITE COMPANY LLC** [US/US]; 6001 Bollinger Canyon Road, San Ramon, CA 94583-2324 (US).(72) Inventors: **ZHANG, Jingwen**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **JIANG, Peijun**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **CANICH, Jo, Ann M.**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **HAGADORN, John, R.**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **LIN, Yen-Hao**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **MATTLER, Sarah**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **ECKERT, Chase, A.**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **REED, Aaron**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149, Houston, TX 77520 (US). **BARRY, Adrian, G.**; c/o ExxonMobil Chemical Company, 5200 Baytown Drive, P.O. Box 2149,

(54) Title: ETHYLENE-PROPYLENE BRANCHED COPOLYMERS USED AS VISCOSITY MODIFIERS

Dynamic frequency sweep on neat polymers at 190°C for C1 and representative inventive long chain branched EP copolymers, respectively.

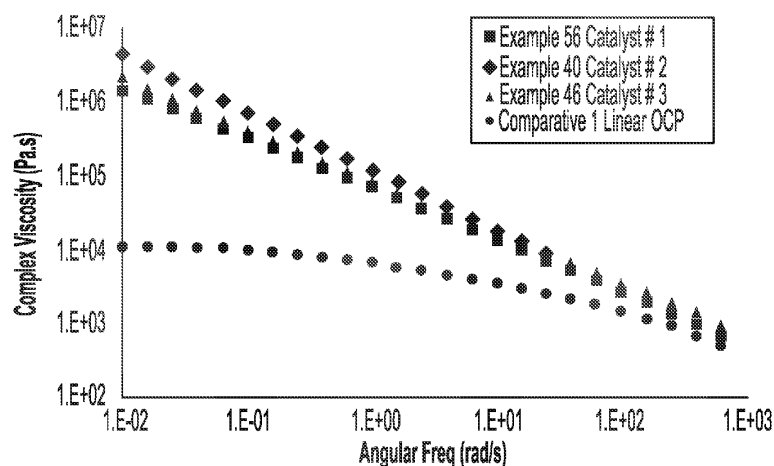


FIG. 2

(57) **Abstract:** The present disclosure also relates to lubrication compositions comprising a long branched ethylene copolymer and methods for making compositions. Compositions of the present disclosure can be a composition including an oil and an ethylene copolymer, the copolymer having one or more of an MWD from about 2.0 to about 6.5; an Mw(LS) from about 30,000 to about 300,000 g/mol; a  $g'_{vis}$  of from about 0.5 to about 0.97; an ethylene content of about 40 wt% to less than 80 wt%. The composition has a shear stability index (30 cycles) of from about 1% to about 60%; and a kinematic viscosity at 100°C of from about 3 cSt to about 25 cSt. A method of making a composition includes blending an oil with a copolymer is also disclosed. Additionally, provided are novel long chain branched ethylene propylene copolymers and methods to produce such copolymers.

[Continued on next page]

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