



(51) International Patent Classification:

F16G 13/06 (2006.01) *C10M 103/02* (2006.01)
C30B 25/18 (2006.01) *C30B 29/04* (2006.01)

(21) International Application Number:

PCT/GB2013/051016

(22) International Filing Date:

22 April 2013 (22.04.2013)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

1207515.6 27 April 2012 (27.04.2012) GB
1207687.3 2 May 2012 (02.05.2012) GB
1211950.9 5 July 2012 (05.07.2012) GB

(71) Applicant: **RENOLD PLC** [GB/GB]; Styal Road,
Wythenshawe, Wythenshawe, Manchester Greater
Manchester M22 5WL (GB).

(72) Inventors: **KINLOCH, Ian**; c/o The University of
Manchester I3 Ltd, Core Technology Facility, 46 Grafton

Street, Manchester Greater Manchester M13 9NT (GB).
LEWIS, Amanda; c/o The University of Manchester I3
Ltd, Core Technology Facility, 46 Grafton Street,
Manchester Greater Manchester M13 9NT (GB). **KING,
Martin**; c/o Renold PLC, Styal Road, Wythenshawe,
Manchester Greater Manchester M22 5WL (GB).

(74) Agent: **MARKS & CLERK LLP**; 1 New York Street,
Manchester, Greater Manchester M1 4HD (GB).

(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, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
KR, KZ, LA, LC, LK, LR, LS, LT, 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, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.

[Continued on next page]

(54) Title: METHODS FOR APPLYING GRAPHENE COATINGS AND SUBSTRATES WITH SUCH COATINGS

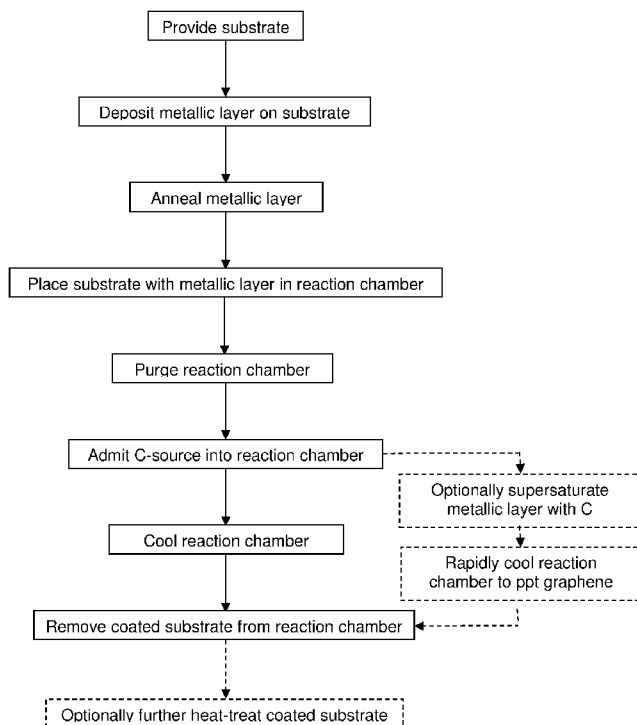


FIG 4

(57) Abstract: A method for applying a graphene coating to a substrate comprising iron or aluminium, the method comprising: providing a metallic layer on a surface of the substrate; and contacting said metallic layer with a source of carbon atoms to provide a graphene coating on the metallic layer. There is also described an iron- or aluminium-containing substrate, for example a component of a chain, with a metallic layer on a surface of the substrate and a graphene coating disposed on said metallic layer.



(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, 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, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

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))*