

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
21 December 2007 (21.12.2007)

PCT

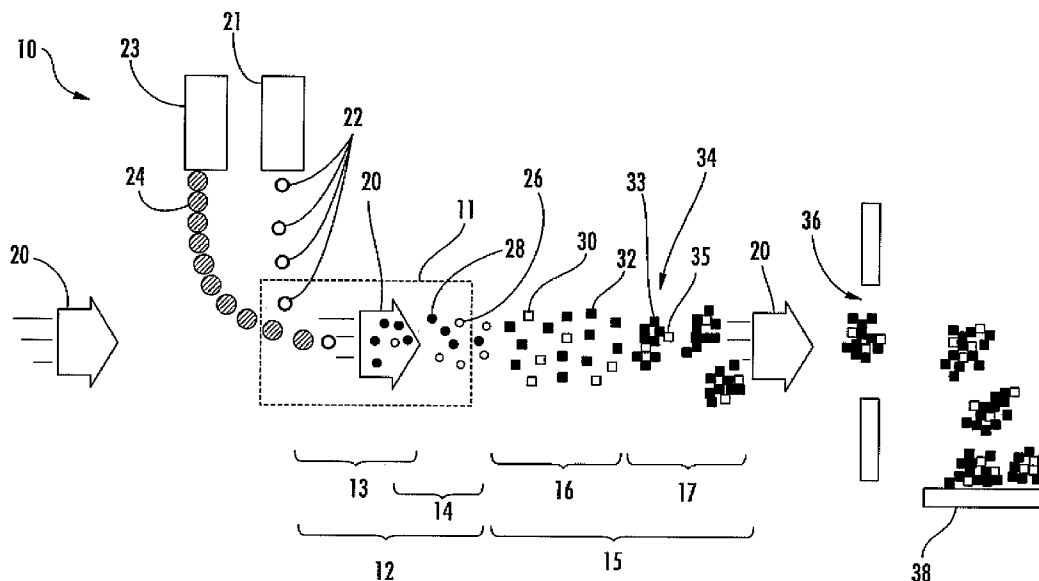
(10) International Publication Number  
**WO 2007/146508 A3**

- (51) International Patent Classification:  
*C01F 17/00* (2006.01)     *H05H 1/26* (2006.01)
- (21) International Application Number:  
PCT/US2007/067993
- (22) International Filing Date:     2 May 2007 (02.05.2007)
- (25) Filing Language:     English
- (26) Publication Language:     English
- (30) Priority Data:  
11/415,840     2 May 2006 (02.05.2006)     US
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:  
— with international search report

[Continued on next page]

(54) Title: HIGH VOLUME PRODUCTION OF NANOSTRUCTURED MATERIALS



(57) Abstract: A system and method for high volume production of nanoparticles, nanotubes, and items incorporating nanoparticles and nanotubes. Microwave, radio frequency, or infrared energy vaporizes a metal catalyst which, as it condenses, is contacted by carbon or other elements such as silicon, germanium, or boron to form agglomerates. The agglomerates may be annealed to accelerate the production of nanotubes. Magnetic or electric fields may be used to align the nanotubes during their production. The nanotubes may be separated from the production byproducts in aligned or non-aligned configurations. The agglomerates may be formed directly into tools, optionally in compositions that incorporate other materials such as abrasives, binders, carbon-carbon composites, and cermets.

WO 2007/146508 A3



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**(88) Date of publication of the international search report:**  
3 April 2008

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/67993

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C01F 17/00; H05H 1/26 (2007.10)

USPC - 423/263, 427/446

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC - 65/17.6, 65/21.1, 65/391, 65/436, 423/263, 427/446, 427/427, 427/452, 427/562, 427/567, 427/452, 427/562, 427/567, 427/569, 427/578, 438/80, 977/778, 118/302

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST (PGPB,USPT,USOC,EPAB,JPAB); Dialog Classic Files 654, 652, 351, 2, 6, 35, 65; USPTO Web Page; Google Patents; Google Scholar: catalyst, feeder, nanostructure, nanoparticle, microwave, plasma, cathode glow discharge, vaporizer, agglomerate, condenser, carbon, silicon, boron, germanium

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X - Y	US 2005/0230356 A1 (EMPEDOCLES et al.) 20 Oct 2005 (20.10.2005); para [0002], [0006], [0007], [0012], [0015], [0018], [0022], [0029], [0031], [0045], [0049], [0050], [0052], [0067], [0092], [0093], [0096], [0122], [0144], [0149], [0197], [0202], [0203], [0205], [0209], [0211], [0241], Fig 4	1,4-8,10,11,13,15,16,19 and 20 ----- 2, 3, 9, 12, 14, 17 and 18
Y	US 2003/0203205 A1 (BI et al.) 30 Oct 2003 (30.10.2003); para [0141], [0150], [0158], [0171], [0185], [0205], [0215]	2, 3, 12, 14, 17 and 18
Y	US 2004/0118347 A1 (GROVES et al.) 24 Jun 2004 (24.06.2004); para [001], [0016], [0017], [0040], [0060]	9

 Further documents are listed in the continuation of Box C.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

29 November 2007 (29.11.2007)

Date of mailing of the international search report

15 JAN 2008

Name and mailing address of the ISA/US

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P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

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