

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

(19) World Intellectual Property  
Organization  
International Bureau

(43) International Publication Date  
27 May 2022 (27.05.2022)



(10) International Publication Number  
**WO 2022/108786 A1**

(51) International Patent Classification:

A61B 5/15 (2006.01) A61M 25/06 (2006.01)  
A61B 5/154 (2006.01)

(21) International Application Number:

PCT/US2021/058606

(22) International Filing Date:

09 November 2021 (09.11.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

202011289322.4 18 November 2020 (18.11.2020) CN

(71) Applicant: **BECTON, DICKINSON AND COMPANY**  
[US/US]; 1 Becton Drive, Franklin Lakes, New Jersey  
07417 (US).

(72) Inventors: **XUE, Yueqiang**; Room 9-1001, No. 409 Qing-  
tong Road, Pudong District, Shanghai, Shanghai 201203

(CN), **YAN, Bo**; 9F/10F, Tower 3, JingAn Kerry Centre  
No 1228, Yan'an Road Middle, JingAn District, Shanghai,  
Shanghai 200040 (CN). **BURKHOLZ, Jonathan Karl**;  
1971 South Wasatch Drive, Salt Lake City, Utah 84108  
(US). **NATESAN, Mohankumar**; Blk 24, Bukit Batok  
Street 52, 05-02, Bukit Batok 659246 (SG). **CHENG, Ki-  
at Jin**; Blk 125 Bishan Street 12 #02-103, Bishan 570125  
(SG).

(74) Agent: **BLAIR, Whitney**; Kirton McConkie, 36 South  
State Street, Suite 1900, Salt Lake City, Utah 84111 (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,

(54) Title: BLOOD COLLECTION DEVICES, SYSTEMS, AND METHODS

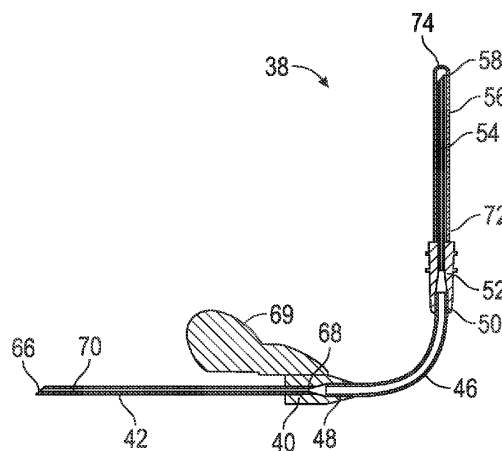


FIG. 2B

(57) Abstract: A catheter system may include a catheter assembly, which may include a catheter adapter and a catheter extending distally from the catheter adapter. The catheter system may include a needle assembly, which may include a needle hub and an introducer needle extending distally from the needle hub. The introducer needle may extend through the catheter. The needle assembly may also include an extension tube, which may include a distal end integrated with the needle hub and a proximal end integrated with a cannula hub. A cannula may extend proximally from the cannula hub. An elastomeric sheath may be coupled to the cannula hub, and a proximal end of the cannula may be enveloped within the elastomeric sheath. In response to the blood collection tube pushing the elastomeric sheath distally, the cannula may pierce the elastomeric sheath, and the cannula may insert into the blood collection tube.

[Continued on next page]



WO 2022/108786 A1

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).

**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))*