

CLAIMS

What is claimed is:

1. Integrated tubing, comprising:
a tubing wall of the integrated tubing;
one or more lumens of the integrated tubing, each lumen of the one or more lumens defined at least in part by the tubing wall; and
a longitudinal bead of the integrated tubing between opposing sides of the tubing wall, the longitudinal bead including one or more optical fibers disposed therein.
2. The integrated tubing of claim 1, wherein the integrated tubing has one lumen.
3. The integrated tubing of claim 2, wherein the longitudinal bead is incorporated into the tubing wall.
4. The integrated tubing of claim 1, wherein the integrated tubing has two or more lumens.
5. The integrated tubing of claim 4, wherein each lumen of the two or more lumens has approximately a same volume as another lumen of the two or more lumens in an arbitrary length of the integrated tubing.
6. The integrated tubing of claim 4, wherein at least one lumen of the two or more lumens has a different volume than another lumen of the two or more lumens in an arbitrary length of the integrated tubing.
7. The integrated tubing of any claim of claims 4-6, further comprising one or more septa of the integrated tubing, each lumen of the two or more lumens further defined at least in part by the one or more septa.
8. The integrated tubing of claim 7, wherein the longitudinal bead is incorporated into the tubing wall.
9. The integrated tubing of claim 7, wherein the longitudinal bead is incorporated into at least one septum of the one or more septa.

10. The integrated tubing of claim 7, wherein the longitudinal bead is incorporated into each septum of the one or more septa.
11. The integrated tubing of any claim of claims 1-10, wherein the longitudinal bead has one optical fiber disposed therein.
12. The integrated tubing of any claim of claims 1-10, wherein the longitudinal bead has a bundle of optical fibers disposed therein.
13. The integrated tubing of any claim of claims 1-12, wherein the integrated tubing is bump tubing.
14. A medical device, comprising:
 - a catheter tube including:
 - a catheter-tube wall of the catheter tube; and
 - one or more lumens of the catheter tube, each lumen of the one or more lumens defined at least in part by the catheter-tube wall; and
 - an integrated stylet of one or more optical fibers, the catheter tube including a longitudinal bead between opposing sides of the catheter tube having the one or more optical fibers disposed therein.
15. The medical device of claim 14, wherein the catheter tube has one lumen.
16. The medical device of claim 15, wherein the longitudinal bead is incorporated into the catheter-tube wall.
17. The medical device of claim 15, wherein the catheter tube has two or more lumens.
18. The medical device of claim 17, wherein each lumen of the two or more lumens has approximately a same volume as another lumen of the two or more lumens in an arbitrary length of the catheter tube.
19. The medical device of claim 17, wherein at least one lumen of the two or more lumens has a different volume than another lumen of the two or more lumens in an arbitrary length of the catheter tube.

20. The medical device of any claim of claims 17-19, further comprising one or more septa of the catheter tube, each lumen of the two or more lumens further defined at least in part by the one or more septa.

21. The medical device of claim 20, wherein the longitudinal bead is incorporated into the catheter-tube wall.

22. The medical device of claim 20, wherein the longitudinal bead is incorporated into at least one septum of the one or more septa.

23. The medical device of claim 20, wherein the longitudinal bead is incorporated into each septum of the one or more septa.

24. The medical device of any claim of claims 14-23, wherein the longitudinal bead has one optical fiber disposed therein.

25. The medical device of any claim of claims 14-23, wherein the longitudinal bead has a bundle of optical fibers disposed therein.

26. The medical device of any claim of claims 14-25, wherein a distal-end portion of the catheter tube has a smaller diameter than a proximal-end portion of the catheter tube, the distal-end portion of the catheter tube configured to interface with a patient's anatomy and the proximal-end portion of the catheter tube configured to interface with procedural equipment or instrumentation.

27. The medical device of any claim of claims 14-26, wherein the medical device is a peripherally inserted central catheter or a central venous catheter.

28. A method for manufacturing integrated tubing, comprising:
threading at least one optical fiber through a die of an extruder;
forcing a molten polymeric material through the die around the optical fiber to
form the integrated tubing with the optical fiber disposed within a
longitudinal bead of the integrated tubing; and
cooling the integrated tubing in a cooling bath by pulling the integrated tubing
through the cooling bath with a puller.
29. The method of claim 28, further comprising coiling the integrated tubing onto
a spool of the integrated tubing with a coiler.
30. The method of claim 28, wherein a rate of pulling the integrated tubing with the
puller is increased to create portions of the integrated tubing with a smaller diameter or
decreased to create portions of the integrated tubing with a larger diameter.
31. The method of claim 30, further comprising cutting the integrated tubing into
predetermined lengths of the integrated tubing with a cutter.
32. The method of claim 31, wherein the cutter is synchronized with the puller such
that each predetermined length of the integrated tubing includes a first-end portion of the
predetermined length having a smaller diameter than a second-end portion of the predetermined
length.
33. The method of claim 32, wherein each predetermined length of the integrated
tubing is a catheter tube, the first-end portion of the predetermined length of the integrated
tubing being a distal-end portion of the catheter tube configured to interface with a patient's
anatomy and the second-end portion of the predetermined length of the integrated tubing being
a proximal-end portion of the catheter tube configured to interface with procedural equipment
or instrumentation.