Claims

1. A peel-away sheath assembly for insertion of a blood pump, the peel-away sheath assembly comprising:

a peel-away sheath hub; and

a peel-away sheath body comprising:

a proximal end connected to the peel-away sheath hub,

a distal end,

an outer layer defining an outer radius of the peel-away sheath body,

an inner layer defining a first lumen of the peel-away sheath body with an inner radius, and

a reinforcing layer located between the inner radius and the outer radius,

wherein the reinforcing layer has a rigidity that is greater than at least one of a rigidity of the inner layer and a rigidity of the outer layer.

2. The peel-away sheath assembly of claim 1, wherein the reinforcing layer is a hypotube.

3. The peel-away sheath assembly of any of claims 1-2, wherein the reinforcing layer comprises at least two circumferential discontinuities.

4. The peel-away sheath assembly of any of claims 1-3, wherein the at least two circumferential discontinuities each comprise slits formed in a surface of the hypotube.

5. The peel-away sheath assembly of any of claims 1-4, wherein the slits on the surface of the hypotube are parallel to one another and are uniformly spaced along a length of the hypotube.

6. The peel-away sheath assembly of any of claims 1-5, wherein the slits on the surface of the hypotube have a length in a circumferential direction, wherein the length of the slits is substantially identical for all slits.

7. The peel-away sheath assembly of any of claims 1-6, the slits comprising:

a set of first slits, each slit of the set of first slits having a center, wherein centers of each slit in the set of first slits form a first slit axis along the length of the hypotube, and

a set of second slits, each slit of the set of second slits having a center, wherein centers of each slit in the set of second slits form a second slit axis along the length of the hypotube, and

wherein the second slit axis is offset by an angle from the first axis.

8. The peel-away sheath assembly of any of claims 1-7, further comprising first and second peel-away lines on a surface of the peel-away sheath body, wherein at any longitudinal location

along the peel-away sheath body, the first slit axis is at a same circumferential location as the first peel-away line and the second slit axis is at a same circumferential location as the second peel-away line.

9. The peel-away sheath assembly of any of claims 1-8 wherein at least one of the peel-away lines is located on an inner surface of the peel-away sheath body.

10. The peel-away sheath assembly of any of claims 1-8 wherein at least one of the peel-away lines is located on an outer surface of the peel-away sheath body.

11. The peel-away sheath assembly of any of claims 1-10, wherein the first and second peel-away lines are diametrically opposed from one another.

12. The peel-away sheath assembly of any of claims 1-11, the peel-away sheath hub further comprising:

a proximal conical portion, and

a distal cylindrical portion.

13. The peel-away sheath assembly of any of claims 1-12, wherein the proximal conical portion comprises a proximal circumferential discontinuity, and wherein the distal cylindrical portion comprises a distal circumferential discontinuity.

14. The peel-away sheath assembly of any of claims 1-13, wherein the proximal circumferential discontinuity and distal circumferential discontinuity are aligned in a longitudinal direction.

15. The peel-away sheath assembly of any of claims 1-14 wherein a distal end of the distal circumferential discontinuity abuts a proximal end of the at least one peel-away line along the surface of the peel-away sheath body.

16. The peel-away sheath assembly of any of claims 1-15, wherein the inner layer and the outer layer comprise a thermoplastic.

17. The peel-away sheath assembly of any of claims 1-16, wherein the thermoplastic is at least one of PEBAX or TPU.

18. The peel-away sheath assembly of any of claims 1-17, wherein the reinforcing layer is at least one of LCP, PEBAX, stainless steel, Nitinol, or Kevlar.

19. The peel-away sheath assembly of any of claims 1-18, wherein the reinforcing layer is present only in the distal portion of the peel-away sheath body.

20. The peel-away sheath assembly of any of claims 1-18, wherein the reinforcing layer is present only in the proximal portion of the peel-away sheath body.

21. The peel-away sheath assembly of any of claims 1-18, wherein the reinforcing layer is present only in a middle portion of the peel-away sheath body.

22. The peel-away sheath assembly of any of claims 1-18, wherein the reinforcing layer is present in alternating portions along the length of the peel-away sheath body.

23. The peel-away sheath assembly of any of claims 1-22 wherein the hypotube is configured as two c-shaped halves.

24. The peel-away sheath assembly of any of claims 1-23 wherein the peel away line on the inner surface of the peel-away sheath body extends along the entire length of the peel-away sheath body.

25. The peel-away sheath assembly of any of claims 1-24 wherein a hydrophilic coating covers at least a portion of the outer layer of the peel-away sheath body.

26. The peel-away sheath assembly of any of claims 1-25 wherein the portion of the outer later covered by the hydrophilic coating extends from the distal end of the peel-away sheath body to about 5 centimeters distal of the proximal end of the peel-away sheath body.

27. The peel-away sheath assembly of any of claims 1-26 wherein the portion of the outer layer covered by the hydrophilic coating extends from the distal end of the sheath body to about 2 centimeters distal of the proximal end of the peel-away sheath body.