

What is claimed is:

1. A sheath assembly for insertion of a medical device into a blood vessel, the sheath assembly comprising:

- 5 an introducer sheath comprising:
- an expandable sheath body having a first length, a longitudinal axis, and proximal and distal ends, the expandable sheath body comprising:
- a first lumen extending between the proximal and distal ends of the expandable sheath body, the first lumen having a first diameter in a first elongated state and a second diameter in a second relaxed state, wherein the second diameter in
10 the second relaxed state is sized to accommodate the medical device;
- a braid forming the first lumen, the braid formed of at least one strand of a first material extending from the proximal end of the expandable sheath body at an acute angle relative to the longitudinal axis of the expandable sheath body; and
15 a polymer encapsulating at least a distal portion of the braid, wherein the polymer can expand or collapse along with the braid, the acute angle and the first material selected to allow the medical device to pass through the expandable sheath body without the expandable sheath body buckling; and
- a dilator assembly comprising:
- 20 an inner dilator having a second length and a second lumen between proximal and distal ends of the inner dilator;
- an outer dilator having a third length and a third lumen between proximal and distal ends of the outer dilator, wherein the outer dilator is axially aligned with the inner dilator and the second length is greater than the third length,
25 wherein the inner dilator and outer dilator are configured to be inserted into the first lumen of the expandable sheath body to adjust a diameter of the expandable sheath body; and
- a hub attachment having a third length and a third lumen between proximal and distal ends of the hub attachment, wherein the hub attachment is coupled to the
30 outer dilator and inner dilator.

2. The sheath assembly of claim 1, wherein the hub attachment comprises a trigger and a slider configured to insert the expandable sheath body into a patient.

3. The sheath assembly of claim 2, wherein the hub attachment is configured to be in a first state in which the trigger is configured to be depressed and the expandable sheath body is configured to be drawn down.
- 5 4. The sheath assembly of claim 2, wherein the hub attachment is configured to be in a second state in which the inner dilator and the outer dilator are configured to move in a distal direction by the slider and are pinching the expandable sheath body.
- 10 5. The sheath assembly of claim 1, wherein the hub attachment is configured to be in a third state in which the inner dilator is configured to move distally relative to the outer dilator to release the expandable sheath body.
- 15 6. The sheath assembly of claim 1, wherein the hub attachment is configured to be in a fourth state in which the outer dilator is configured to move distally relative to the inner dilator in order position the inner dilator and the outer dilator in a fourth state for removal from the hub attachment.
- 20 7. The sheath assembly of claim 1, wherein the hub attachment is configured to be removed from the introducer sheath after insertion of the expandable sheath body into a patient.
8. The sheath assembly of claim 2, wherein the inner dilator is connected to an inner dilator hub, the outer dilator is connected to an outer dilator hub, and the inner dilator hub and outer dilator hub are coupled to the slider.
- 25 9. The sheath assembly of claim 8, wherein the inner dilator hub comprises a luer blocker.
10. The sheath assembly of claim 9, wherein the luer blocker comprises a luer slot to allow for insertion of a guidewire.
- 30 11. A blood pump system, the blood pump system comprising:
a blood pump coupled to a catheter having proximal and distal ends;
an introducer sheath, wherein the introducer sheath is sized to accommodate the blood pump during insertion into a blood vessel; and
a repositioning sheath assembly comprising:

a repositioning sheath;

a first sterile sleeve having a first length and a first lumen between distal and proximal ends of the first sterile sleeve, wherein the distal end of the first sterile sleeve is attached to the proximal end of the repositioning sheath;

5 the repositioning sheath having distal and proximal ends, wherein the distal end of the repositioning sheath is configured to be inserted into the introducer sheath in order to control hemostasis between the introducer sheath and an opening of the blood vessel;

10 a second sterile sleeve having a second length and a second lumen between distal and proximal ends of the second sterile sleeve, wherein the proximal end of the second sterile sleeve is attached to the proximal end of the repositioning sheath, and the distal end of the second sterile sleeve is attached to a proximal end of the introducer sheath.

15 12. The blood pump system of claim 11 further comprising an introducer sheath.

13. The blood pump system of claim 11, wherein the first sterile sleeve and the second sterile sleeve are flexible.

20 14. The blood pump system of claim 11, wherein the first sterile sleeve comprises a first plurality of flexible layers and the second sterile sleeve comprises a second plurality of flexible layers.

25 15. The blood pump system of claim 14, wherein the first and second plurality of flexible layers comprises a flexible material.

16. The blood pump system of claim 11, wherein the catheter extends through: the first sterile sleeve, the repositioning sheath, the second sterile sleeve, and the introducer sheath.

30 17. The blood pump system of claim 16, wherein the catheter extends slideably through the first sterile sleeve and the second sterile sleeve.

18. The blood pump system of claim 11, wherein the repositioning sheath is configured to move relative to the catheter.

19. The blood pump system of claim 18, wherein at least one of the first and second sterile sleeves is configured to be reduced in length when the repositioning sheath is configured to move relative to the catheter.

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20. The blood pump system of claim 12, wherein the introducer sheath comprises:

an expandable sheath frame having a length, a first thickness, a proximal end and a distal end;

10 the frame comprising a plurality of strands extending longitudinally between the proximal end and the distal end, and having an exterior surface and an interior surface that form an interior lumen along the length of the frame;

the frame being configured to achieve an expanded state and a contracted state, the expanded state forming an expanded cross-section in the lumen for passing a medical device therethrough; and

15 the frame having a smooth coating about the exterior surface and protrusions extending into the lumen along the interior surface.