CLAIMS:

1. An expandable sheath for deploying a medical device, comprising:

a first polymeric layer;

a braided layer radially outward of the first polymeric layer, the braided layer comprising a plurality of filaments braided together;

a resilient elastic layer radially outward of the braided layer, the elastic layer being configured to apply radial force to the braided layer and the first polymeric layer; and

a second polymeric layer radially outward of the elastic layer and bonded to the first polymeric layer such that the braided layer and the elastic layer are encapsulated between the first and second polymeric layers;

wherein the plurality of filaments of the braided layer are movable between the first and second polymeric layers such that the braided layer is configured to radially expand as a medical device is passed through the sheath;

wherein when the medical device is passed through the sheath, the diameter of the sheath expands from a first diameter to a second diameter around the medical device while the first and second polymeric layers resist axial elongation of the sheath such that a length of the sheath remains substantially constant; and

wherein the sheath resiliently returns to the first diameter by radial force applied by the elastic layer upon passage of the medical device.

2. The expandable sheath of claim 1, wherein:

the first and second polymeric layers comprise a plurality of longitudinally-extending folds when the sheath is at the first diameter.

3. The expandable sheath of claim 2, wherein the longitudinally extending folds create a plurality of circumferentially spaced ridges and a plurality of circumferentially spaced valleys.

4. The expandable sheath of claim 3, wherein, as a medical device is passed through the sheath, the ridges and valleys level out to allow the sheath to radially expand.

5. The expandable sheath of any one of claims 1-4, wherein the elastic layer comprises one or more elastic bands helically wound over the braided layer.

6. The expandable sheath of claim 5, wherein the elastic layer comprises two elastic bands wound with opposite helicity.

7. The expandable sheath of claim 1, wherein the filaments of the braided layer are not engaged or adhered to the first or second polymeric layers.

8. The expandable sheath of any one of claims 1-7, wherein the filaments of the braided layer are resiliently buckled when the sheath is at the first diameter.

9. The expandable sheath of claim 8, wherein the first and second polymeric layers are attached to each other at a plurality of open spaces between the filaments of the braided layer.

10. The expandable sheath of any one of claims 1-9, further comprising one or more longitudinally extending cords attached to the braided layer.

11. The expandable sheath of any one of claims 1-10, further comprising an outer cover extending longitudinally beyond distal ends of the first polymeric layer, the braided layer, the elastic layer, and the second polymeric layer to form an overhang.

12. The expandable sheath of claim 11, wherein the outer cover comprises one or more longitudinally extending slits, weakened portions, or scorelines.

13. The expandable sheath of claim 11, wherein the outer cover is formed of a heat-shrink material.

14. The expandable sheath of claim 11, wherein the outer cover is elastomeric.

15. An assembly, comprising:

the expandable sheath of any one of claims 1-14 or 23-25, further comprising a distal end portion resiliently expandable between the first diameter and a second diameter;

a vessel dilator disposed within the sheath, the vessel dilator comprising a tapered nose cone and a retaining member that extends at least partially over the distal end portion of the sheath and is configured to retain the distal end portion of the sheath at the first diameter.

16. The assembly of claim 15, wherein the distal end portion is heat-set toward an expanded configuration, and the elastic layer of the sheath terminates proximally of the distal end of the sheath.

17. The assembly of either of claims 15 or 16, wherein a distal end portion of the braided layer is heat-set toward a flared configuration.

18. The assembly of any one of claims 15-17, wherein the retaining member is a polymeric heat-shrink layer.

19. The assembly of any one of claims 15-18, wherein the retaining member is elastomeric and configured to compress the distal end portion of the sheath.

20. The assembly of any one of claims 15-19, wherein the retaining member is glued or fused to the sheath.

21. The assembly of any one of claims 15-20, wherein the retaining mechanism comprises a shaft disposed between the dilator and the sheath, the shaft comprising a releasable coupling that mechanically engages both the dilator and the sheath and that can be manually deactivated.

22. The assembly of any one of claims 15-21, wherein the retaining mechanism comprises one or more balloons disposed between the dilator and the sheath.

23. The device of any one of claims 1-14, wherein a distal end portion of the second polymeric layer extends longitudinally beyond distal ends of the first polymeric layer, the braided layer, and the elastic layer.

24. The device of claim 23, wherein the distal end portion comprises multiple circumferential folds when the sheath is in a collapsed configuration.

25. The device of claim 24, wherein the distal end portion comprises multiple layers of polymer material.