

CLAIMS

What is claimed is:

1. A scaffold delivery apparatus, comprising:

5 a catheter having an inflatable balloon thereupon;

an expandable scaffold secured upon the inflatable balloon; and

a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

wherein the distal spacer is tapered to widen from a distal end to a proximal end

10 adjacent to the scaffold.

2. The apparatus of claim 1 further comprising a proximal spacer positioned beneath or within the inflatable balloon at a location proximal to the scaffold.

15 3. The apparatus of claim 2 wherein the proximal spacer is tapered to narrow from a distal end adjacent to the scaffold to a proximal end.

4. The apparatus of claim 1 wherein a widened end of the distal spacer defines a diameter which is similar to a diameter of the scaffold when crimped upon the balloon to prevent scaffold edges from protruding beyond the spacer.

5. The apparatus of claim 4 wherein expansion of the scaffold for deployment expands the scaffold to a second diameter which is larger than the diameter of the spacer.

25 6. The apparatus of claim 1 wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold.

7. The apparatus of claim 1 wherein the scaffold defines at least a distal tapered edge.

30 8. A scaffold delivery apparatus, comprising:

an inflatable balloon positioned upon a catheter; and
an expandable scaffold secured upon the inflatable balloon,
wherein the scaffold defines at least a distal tapered edge.

5 9. The apparatus of claim 8 further comprising a distal spacer positioned beneath or
within the inflatable balloon at a location distal to the scaffold, wherein the distal spacer is
tapered to widen from a distal end to a proximal end adjacent to the scaffold, and

10 10. The apparatus of claim 8 wherein a distal portion of the inflatable balloon defines
a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the
inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold, and
wherein the scaffold defines at least a distal tapered edge.

15 11. The apparatus of claim 8 further comprising a distal spacer positioned beneath or
within the inflatable balloon at a location distal to the scaffold,
wherein the distal spacer is tapered to widen from a distal end to a proximal end
adjacent to the scaffold,
wherein a distal portion of the inflatable balloon defines a tapered transition adjacent
to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a
20 tapered transition adjacent to the proximal end of the scaffold, and
wherein the scaffold defines at least a distal tapered edge.

25 12. A scaffold delivery apparatus, comprising:
an inflatable balloon positioned upon a catheter; and
an expandable scaffold secured upon the inflatable balloon,
wherein a distal portion of the inflatable balloon defines a tapered transition adjacent
to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a
tapered transition adjacent to the proximal end of the scaffold.

30 13. A scaffold delivery apparatus, comprising:
a catheter having an inflatable balloon thereupon;

an expandable scaffold secured upon the inflatable balloon;
a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold, and

wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold.

14. A scaffold delivery apparatus, comprising:

a catheter having an inflatable balloon thereupon;

an expandable scaffold secured upon the inflatable balloon;

a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold, and

wherein the scaffold defines at least a distal tapered edge.

15. A scaffold delivery apparatus, comprising:

a catheter having an inflatable balloon thereupon;

an expandable scaffold secured upon the inflatable balloon;

wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold, and

wherein the scaffold defines at least a distal tapered edge.

16. A scaffold delivery apparatus, comprising:

a catheter having an inflatable balloon thereupon;

an expandable scaffold secured upon the inflatable balloon;

a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold,

wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a

5 tapered transition adjacent to the proximal end of the scaffold, and

wherein the scaffold defines at least a distal tapered edge.

17. A method of delivery a scaffold, comprising:

10 providing a catheter having an inflatable balloon thereupon, an expandable scaffold secured upon the inflatable balloon, and a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold, wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold; and,

inflating the balloon such that the scaffold is expanded radially beyond the distal spacer.

15

CLAIMS

What is claimed is:

1. A scaffold delivery apparatus, comprising:

5 a catheter having an inflatable balloon thereupon;

an expandable scaffold secured upon the inflatable balloon; and

a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

wherein the distal spacer is tapered to widen from a distal end to a proximal end

10 adjacent to the scaffold.

2. The apparatus of claim 1 further comprising a proximal spacer positioned beneath or within the inflatable balloon at a location proximal to the scaffold.

15 3. The apparatus of claim 2 wherein the proximal spacer is tapered to narrow from a distal end adjacent to the scaffold to a proximal end.

4. The apparatus of claim 1 wherein a widened end of the distal spacer defines a diameter which is similar to a diameter of the scaffold when crimped upon the balloon to prevent scaffold edges from protruding beyond the spacer.

20 5. The apparatus of claim 4 wherein expansion of the scaffold for deployment expands the scaffold to a second diameter which is larger than the diameter of the spacer.

25 6. The apparatus of claim 1 wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold.

7. The apparatus of claim 1 wherein the scaffold defines at least a distal tapered edge.

30 8. A scaffold delivery apparatus, comprising:

an inflatable balloon positioned upon a catheter; and

an expandable scaffold secured upon the inflatable balloon,

wherein the scaffold defines at least a distal tapered edge.

9. The apparatus of claim 8 further comprising a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold, wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold, and

5 10. The apparatus of claim 8 wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold, and wherein the scaffold defines at least a distal tapered edge.

10 11. The apparatus of claim 8 further comprising a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,
 wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold,
 wherein a distal portion of the inflatable balloon defines a tapered transition adjacent
15 to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold, and
 wherein the scaffold defines at least a distal tapered edge.

 12. A scaffold delivery apparatus, comprising:
20 an inflatable balloon positioned upon a catheter; and
 an expandable scaffold secured upon the inflatable balloon,
 wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold.

25 13. A scaffold delivery apparatus, comprising:
 a catheter having an inflatable balloon thereupon;
 an expandable scaffold secured upon the inflatable balloon;
 a distal spacer positioned beneath or within the inflatable balloon at a location distal to
30 the scaffold,
 wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold, and

wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold.

5 14. A scaffold delivery apparatus, comprising:
a catheter having an inflatable balloon thereupon;
an expandable scaffold secured upon the inflatable balloon;
a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

10 wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold, and

wherein the scaffold defines at least a distal tapered edge.

15 15. A scaffold delivery apparatus, comprising:
a catheter having an inflatable balloon thereupon;
an expandable scaffold secured upon the inflatable balloon;
wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold, and

20 wherein the scaffold defines at least a distal tapered edge.

16. A scaffold delivery apparatus, comprising:
a catheter having an inflatable balloon thereupon;
an expandable scaffold secured upon the inflatable balloon;
25 a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold,

wherein the distal spacer is tapered to widen from a distal end to a proximal end adjacent to the scaffold,

30 wherein a distal portion of the inflatable balloon defines a tapered transition adjacent to a distal end of the scaffold and a proximal portion of the inflatable balloon defines a tapered transition adjacent to the proximal end of the scaffold, and

wherein the scaffold defines at least a distal tapered edge.

17. A method of delivery a scaffold, comprising:

providing a catheter having an inflatable balloon thereupon, an expandable scaffold secured upon the inflatable balloon, and a distal spacer positioned beneath or within the inflatable balloon at a location distal to the scaffold, wherein the distal spacer is tapered to

5 widen from a distal end to a proximal end adjacent to the scaffold; and,

inflating the balloon such that the scaffold is expanded radially beyond the distal spacer.

18. The apparatus of claim 15 wherein the catheter comprises an intravascular

10 catheter.

19. The apparatus of claim 15 wherein the expandable scaffold has a wall thickness greater than 50 μm .

15 20. The apparatus of claim 15 wherein the expandable scaffold is crimped upon the inflatable balloon which is deflated.

21. The apparatus of claim 15 wherein the distal portion and the proximal portion of the inflatable balloon each define a step in the inflatable balloon to accommodate a diameter
20 change due to a wall thickness of the scaffold.

22. The apparatus of claim 21 wherein the steps abut the scaffold in a tapered manner to present a smooth balloon-scaffold transition.