We claim:

1. A tool for making retroreflective articles comprising:

(a) a substrate comprising a patterned surface comprising an array of microstructured retroreflective elements; and

(b) a welding seam through at least a portion of the array;

wherein an optically degraded area adjacent the welding seam on the patterned surface has a width of about 400 μm or less.

2. The tool of claim 1 wherein the patterned surface comprises cube corner elements.

3. The tool of claim 1 or 2 wherein the width of the optically degraded area is between about 50 μm and about 400 μm.

4. The tool of any of claims 1 – 3 wherein the width of the optically degraded area is about 300 μm or less.

5. The tool of any of claims 1 – 4 wherein the width of the optically degraded area is about 200 μm or less.

6. The tool of any of claims 1 – 5 wherein the width of the optically degraded area is about 100 μm or less.

7. The tool of any of claims 1 – 6 wherein tensile strength of the seam is about 50 kpsi or more.

8. The tool of any of claims 1 – 7 wherein the tool is a cylinder, belt or sleeve.

9. The tool of any of claims 1 – 8 wherein the substrate comprises two tooling elements connected by the welding seam.

10. A retroreflective article replicated from the tool of any of claims 1 – 9 or from a replica thereof.

11. Retroreflective sheeting comprising a patterned surface comprising a three dimensional array of microstructured retroreflective elements and a welding seam through at least a portion of the array; wherein an optically degraded area adjacent the welding seam on the patterned surface has a width of about 400 μm or less.

12. The retroreflective sheeting of claim 11 wherein the patterned surface comprises cube corner elements.

13. The retroreflective sheeting of claim 11 or 12 wherein the width of the optically degraded area is between about 50 μm and about 400 μm.

14. The retroreflective sheeting of any of claims 11 – 13 wherein the width of the optically degraded area is about 300 μm or less.

15. The retroreflective sheeting of any of claims 1 – 14 wherein the width of the optically degraded area is about 200 μm or less.

16. The retroreflective sheeting of any of claims 1 – 15 wherein the width of the optically degraded area is about 100 μm or less.

17. A method for making a tool for retroreflective articles comprising welding the ends of two substantially planar tooling elements together with single spatial mode laser in continuous wave mode operation to form a welded seam; wherein each tooling element comprises a patterned side comprising an array of microstructured retroreflective elements and a flat back side opposite the patterned side.

18. The method of claim 17 wherein an optically degraded area adjacent the welded seam on the patterned side has a width of about 400 μm or less.

19. The method of claim 17 or 18 wherein the width of the optically degraded area is between about 50 μm and about 400 μm.

20. The method of any of claims 17 – 19 wherein the width of the optically degraded area is about 300 μm or less.

21. The method of any of claims 17 – 20 wherein the width of the optically degraded area is about 200 μm or less.

22. The method of any of claims 17 – 21 wherein the width of the optically degraded area is about 100 μm or less.

23. The method of any of claims 17 – 22 wherein the patterned surface comprises cube corner elements.

24. The method of any of claims 17 – 23 wherein the laser is a fiber laser or a disk laser.

25. The method of any of claims 1 – 24 wherein the laser is a fiber laser.

26. The method of any of claims 17 – 25 wherein welding the ends of two substantially planar tooling elements together comprises welding from the back side of the tooling elements.

27. The method of claim 26 wherein the two tooling elements are joined at the welded seam with less than 100% penetration.

28. The method of claim 27 further comprising welding the two tooling elements from the patterned side at a lower power than the back side welding.

29. The method of any of claims 17 – 28 further comprising replicating a mold or a retroreflective article from the tool.

30. The method of any of claims 17 – 29 wherein the tool is welded to form a cylinder, belt or sleeve.

CLAIMS:

1. A tool for making retroreflective articles comprising:

(a) a substrate comprising a patterned surface comprising an array of microstructured retroreflective elements; and

(b) a welding seam through at least a portion of the array;

wherein an optically degraded area adjacent the welding seam on the patterned surface has a width of about 400 μm or less.

2. The tool of claim 1 wherein the patterned surface comprises cube corner elements.

3. The tool of claim 1, wherein the width of the optically degraded area is between about 50 μm and about 400 μm.

4. The tool of claim 1, wherein the width of the optically degraded area is about 200 μm or less.

5. The tool of any of claim 1, wherein the width of the optically degraded area is about 100 μm or less.

6. The tool of any of claim 1, wherein tensile strength of the welding seam is about 50 kpsi or more.

7. The tool of claim 1, wherein the tool is a cylinder, belt or sleeve.

8. The tool of claim 1, wherein the substrate comprises two tooling elements connected by the welding seam.

9. A retroreflective article replicated from the tool of claim 1 or from a replica thereof.

10. Retroreflective sheeting comprising a patterned surface comprising a three dimensional array of microstructured retroreflective elements and a welding seam through at least a portion of the array; wherein an optically degraded area adjacent the welding seam on the patterned surface has a width of about 400 μm or less.

11. The retroreflective sheeting of claim 10 wherein the patterned surface comprises cube corner elements.

12. The retroreflective sheeting of claim 10, wherein the width of the optically degraded area is between about 50 μm and about 400 μm.

13. The retroreflective sheeting of claim 10, wherein the width of the optically degraded area is about 200 μm or less.

14. A method for making a tool for retroreflective articles comprising:

welding the ends of two substantially planar tooling elements together with a single spatial mode laser in continuous wave mode operation to form a welded seam;

wherein each tooling element comprises a patterned side comprising an array of microstructured retroreflective elements and a flat back side opposite the patterned side.

15. The method of claim 14, wherein an optically degraded area adjacent the welded seam on the patterned side has a width of about 400 μm or less.

16. The method of claim 15, wherein the width of the optically degraded area is between about 50 μm and about 400 μm.

17. The method of claim 15, wherein the width of the optically degraded area is about 200 μm or less.

18. The method of claim 15, wherein the width of the optically degraded area is about 100 μm or less.

19. The method of claim 14, wherein the microstructured retroreflective elements include cube corner elements.

20. The method of claim 14, wherein the laser is a fiber laser or a disk laser.

21. The method of claim 14, wherein welding the ends of two substantially planar tooling elements together comprises welding from the back side of the tooling elements.

22. The method of claim 14, wherein the two tooling elements are joined at the welded seam with less than 100% penetration.

23. The method of claim 14, further comprising welding the two tooling elements from the patterned side at a lower power than the back side welding.

24. The method of claim 14, further comprising replicating a mold or a retroreflective article from the tool.

25. The method of claim 14, wherein the tool is welded to form a cylinder, belt or sleeve.