CLAIMS

1. A visible spectrum optical component, comprising:

a transparent substrate including a surface; and

dielectric nanostructures over the surface of the transparent substrate,

wherein at least one of the dielectric nanostructures has a dimension along a short axis, a dimension along a long axis that is different from the dimension along the short axis, and sidewalls having a surface roughness of no greater than 5 nm.

2. The optical component of claim 1, wherein the dimension along the short axis is no greater than 200 nm, the dimension along the long axis is substantially perpendicular to the surface of the transparent substrate and is at least twice the dimension along the short axis.

3. The optical component of claim 1, wherein a ratio of the dimension along the long axis to the dimension along the short axis is at least 5:1.

4. The optical component of any one of claims 1 to 3, wherein the sidewalls are substantially perpendicular to the surface of the transparent substrate.

5. The optical component of any one of claims 1 to 4, wherein the surface roughness is no greater than 2 nm.

6. The optical component of any one of claims 1 to 5, wherein the dielectric nanostructures include a dielectric material that is amorphous or single-crystalline.

7. The optical component of any one of claims 1 to 5, wherein the dielectric nanostructures include a dielectric material having a light transmittance of at least 50% over the visible spectrum.

8. The optical component of any one of claims 1 to 5, wherein the dielectric nanostructures include a dielectric material having an imaginary part of a refractive index no greater than 0.1

over the visible spectrum, and a real part of the refraction index of at least 2 over the visible spectrum.

9. The optical component of any one of claims 1 to 8, wherein the optical component is configured to introduce a phase profile on incident light.

10. The optical component of any one of claims 1 to 9, wherein the optical component is a lens, a collimator, a polarizer, or a hologram.

11. The optical component of any one of claims 1 to 10, wherein at least one of the dielectric nanostructures has a circular cross-section.