Claims

1. A method of coating a sapphire substrate with an anti-reflective coating, the method comprising:
providing a sapphire substrate;
applying a liquid formulation to the substrate to form a coated substrate, wherein the liquid formulation comprises a crosslinkable silicon-based material and a solvent; and
curing the coated substrate at a temperature of at least 500ºC to form an anti-reflective layer on the sapphire substrate, wherein the anti-reflective layer has refractive index of 1.23 to 1.45 and a Mohs hardness of at least 4.

2. The method of claim 1, wherein the coated substrate has a transmittance to light in the in the visible optical wavelength range from 380 to 800 nm of 90% or higher.

3. The method of claim 1, wherein the anti-reflective coating has a thickness from 50 nm to 150 nm.

4. The method of claim 1, wherein the silicon-containing material is formed from one or more crosslinkable siloxane oligomers;
wherein the one or more crosslinkable siloxane oligomers comprise methylsiloxane oligomers having a number average molecular weight of 1000 Dalton to 5000 Dalton.

5. The method of claim 1, wherein the sapphire substrate has opposing first and second surfaces, the anti-reflective coating being in contact with the first surface of the sapphire substrate, the coated substrate further comprising a second anti-reflective coating in contact with the second surface of the sapphire substrate.

6. The method of claim 1, further comprising:
a layer comprising SiO_2 disposed over the anti-reflective coating; and
an anti-fingerprinting coating in contact with the anti-reflective coating.

7. The method of claim 1, wherein the sapphire substrate is intended to form part of a display, camera, lens, or optical equipment.

8. The method of claim 1, wherein the solvent is selected from the group consisting of water, ethanol, isopropyl alcohol, acetone, methanol, n-propanol, n-butanol, methyl ethyl ketone, diethyl ketone, butyl acetate, ethyl acetate, propylene glycol methyl ether acetate, and mixtures thereof.

9. The method of claim 1, further comprising the additional steps of:
applying a layer comprising SiO2 over the anti-reflective layer; and
applying an anti-fingerprinting coating over the layer comprising SiO_2.