What is claimed is:

1. A multilayer barrier film, comprising:

a hardcoat layer comprising nanoparticles hosted by a binder, the binder comprising one or more silicone (meth)acrylate additives; and

a barrier layer directly disposed on a major surface of the hardcoat layer.

2. The multilayer barrier film of claim 1, wherein the one or more silicone (meth)acrylate additives include polydimethylsiloxane (PDMS) acrylate, and the hardcoat layer comprises from 0.01 wt% to 10 wt% of the polydimethylsiloxane (PDMS) acrylate based on the total weight of the hardcoat layer.

3. The multilayer barrier film of claim 1, wherein the binder of the hardcoat layer further comprises cured acrylate formed by curing at least one of acrylic, (meth)acrylic oligomer, or monomer binder.

4. The multilayer barrier film of claim 1, wherein the hardcoat layer comprises from 15 wt% to 70 wt% of the binder and from 30 wt% to 85 wt% of the nanoparticles based on the total weight of the hardcoat layer.

5. The multilayer barrier film of claim 1, wherein the nanoparticles comprise from 10 wt% to 50 wt% of a first group of nanoparticles having an average particle diameter in a range from 2 nm to 200 nm, and from 50 wt% to 90 wt% of a second group of nanoparticles having an average particle diameter in a range from 60 nm to 400 nm.

6. The multilayer barrier film of claim 5, wherein the ratio of average particle diameters of the first group of nanoparticles and the second group of nanoparticles is in a range from 1:2 to 1:200.

7. The multilayer barrier film of claim 1, wherein the barrier layer comprises a random covalent network containing silicon and one or more of carbon, oxygen, nitrogen, hydrogen and fluorine.

8. The multilayer barrier film of claim 1, wherein the barrier layer is a layer of diamond-like glass (DLG) material.