Claims

1. A composite material comprising:

a substrate having a surface; and

an amorphous metal oxide coating on the surface of said substrate, where the amorphous metal oxide coating comprises an amorphous contact surface of the composite material, wherein:

the amorphous metal oxide coating comprises a blend of ZrO_2 and Y_2O_3, wherein the blend of ZrO_2 and Y_2O_3 comprises individual ZrO_2 entities and individual Y_2O_3 entities; and

the amorphous metal oxide coating on the surface of the substrate is from 5 nm to 100 nm thick.

2. The composite material according to Claim 1, wherein the amorphous metal oxide coating further comprises one or more of Ag_2O, ZnO, TiO_2, and CuO.

3. The composite material according to Claim 1, wherein a wt% content of each metal oxide varies throughout the amorphous metal oxide coating, such that at any given location one of the metal oxides is present in an amount of from 0 wt% to 100 wt%.

4. The composite material according to Claim 3, wherein a wt% content of each metal oxide varies throughout the amorphous metal oxide coating, such that at any given location one of the metal oxides is present in an amount of from 5 wt% to 95 wt%.

5. The composite material according to Claim 1, wherein a wt% content of each metal oxide is constant throughout the amorphous metal oxide coating, such that each metal oxide is present in an amount of from 0.1 wt% to 99.5 wt%.

6. The composite material according to Claim 5, wherein ZrO_2 is present in an amount of from 1 wt% to 99 wt% throughout the amorphous metal oxide coating, with a balance being Y_2O_3.

7. The composite material according to Claim 6, wherein ZrO_2 is present in an amount of from 15 wt% to 85 wt% throughout the amorphous metal oxide coating, with a balance being Y_2O_3.

8. The composite material according to Claim 7, wherein ZrO_2 is present in an amount of from 20 wt% to 80 wt% throughout the amorphous metal oxide coating, with a balance being Y_2O_3.

9. The composite material according to Claim 8, wherein ZrO_2 is present in an amount of from 50 wt% throughout the amorphous metal oxide coating, with a balance being Y_2O_3.

10. The composite material according to Claim 1, wherein the substrate is selected from the group consisting of titanium and silicon oxide.

11. The composite material according to Claim 1, wherein the substrate is in a form of a transparent slide suitable for microscopy or in the form of a medical implant.

12. The composite material according to Claim 11, wherein:

(a) the substrate is a temporary medical implant where the amorphous metal oxide coating comprises from 65 to 99.5 wt% of Y_2O_3;

(b) the substrate is a permanent medical implant where the amorphous metal oxide coating comprises from 50 to 99.5 wt% of ZrO_2; or

(c) the substrate is an intraocular lens where the amorphous metal oxide coating comprises from 65 to 99.5 wt% of Y_2O_3.

13. The composite material according to Claim 1, wherein the amorphous metal oxide coating has a root mean square roughness of from 0.1 to 0.7 nm.