CLAIMS:

1. A coating deposited on a substrate, the coating comprising:

   a deep black metal oxide and/or oxynitride layer deposited directly onto the substrate or onto a metallic-adhesion promoting layer

   followed by a hard and optically transparent oxynitride layer.

2. The coating according to claim 1, wherein the deep black metal oxide and/or oxynitride layer have $L^* < 40$.

3. The coating according to claim 1, wherein the deep black metal oxide and/or oxynitride layer includes one or more metals or one or more rare earth metals or one or more metalloids or one or more alkaline earth metals.

4. The coating according to claim 3, wherein the one or more metals includes Al, Ti, Cr, Ni, Nb, V, Fe, Mo, Ta, W or Hf or the one or more rare earth metals includes Y, Ce, Gd or Er or the one or more metalloids includes Si, C or B or the one or more alkaline earth metals includes Mg, Ca, Sr or Be.

5. The coating according to claim 1, wherein the deep black metal oxide and/or oxynitride layer includes a decreasing concentration of metal and an increasing concentration of oxygen or a combination of oxygen and nitrogen as measured from the substrate.

6. The coating according to claim 5, wherein the deep black metal oxide and/or oxynitride layer is $Me_{1-x}R_x$ where $0.05 < x < 0.5$ and R is a non-metallic element that includes oxygen and/or a combination of oxygen and nitrogen.

7. The coating according to claim 5, wherein in the deep black oxynitride layer a ratio of oxygen to nitrogen is fixed and is 0.4 or above.

8. The coating according to claim 1, wherein the deep black metal oxide and/or oxynitride layer has a thickness greater than 0.1 μm, preferably greater than 0.3 μm, and most preferably greater than 0.5 μm.

9. The coating according to claim 1, further comprising:

an optically transparent oxynitride layer deposited on the deep black metal oxide and/or oxynitride layer.

10. The coating according to claim 9, wherein the optically transparent oxynitride layer includes one or more metals or one or more rare earth metals or one or more metalloids or one or more alkaline earth metals.

11. The coating according to claim 10, wherein the one or more metals includes Al, Ti, Cr, Ni, Nb, V, Fe, Mo, Ta, W or Hf or the one or more rare earth metals includes Y, Ce, Gd or Er or the one or more metalloids includes Si, C or B or the one or more alkaline earth metals includes Mg, Ca, Sr or Be.

12. The coating according to claim 9, wherein the optically transparent oxynitride layer is a monolithic layer having a content of metal that is between 0.4 to 0.5, a content of oxygen that is between 0.05 to 0.1 and a content of nitrogen that is between 0.4 to 0.45.

13. The coating according to claim 9, wherein the optically transparent oxynitride layer has a thickness greater than 0.3 μm, preferably greater than 0.5 μm, and most preferably greater than 1.0 μm.

14. The coating according to claim 9, wherein the optically transparent oxynitride layer has a hardness that is greater than 12 Gpa, preferably greater than 15 Gpa, and most preferably greater than 20 GPa.

15. A process of depositing a deep black coating on a substrate, comprising steps of:

implementing a closed loop control of a reactive gas in a coating chamber to deposit a deep black metal oxide and/or oxynitride layer directly onto the substrate; and

maintaining conditions achieved during the foregoing step for a predetermined period of time to deposit an optically transparent oxynitride layer on the deep black metal oxide and/or oxynitride layer.

16. The process according to claim 15, wherein prior to said step of implementing, steps of:

solvent cleaning the substrate;

placing the substrate in a coating chamber;

evacuating the coating chamber;

plasma etching the substrate; and

exposing the substrate to bipolar power to create an adhesion layer on the substrate.