CLAIMS

1. Method for surface treatment of a ceramic material in powder form, said method comprising the step of providing a powder formed of a plurality of particles of the ceramic material to be treated, and subjecting said ceramic powder particles to an ion implantation process by directing towards an external surface of said particles a beam of singly or multiply charged ions produced by a source of singly or multiply charged ions, the singly or multiply charged ions are accelerated at a voltage comprised between 15,000 and 35,000 volts.

2. Method according to claim 1, characterized in that the ceramic powder particles are agitated throughout the entire duration of the ion implantation process.

3. Method according to claim 1, characterized in that the grain size of the ceramic powder particles used is such that 50% of all the particles have a dimension smaller than 2 micrometres.

4. Method according to claim 2, characterized in that the grain size of the ceramic powder particles used is such that 50% of all the particles have a dimension smaller than 2 micrometres.

5. Method according to claim 3, characterized in that the dimension of the ceramic powder particles used is comprised between 1.2 micrometres and 63 micrometres.

6. Method according to claim 4, characterized in that the dimension of the ceramic powder particles used is comprised between 1.2 micrometres and 63 micrometres.

7. Method according to any of claims 1 to 6, characterized in that the ceramic material is a carbide, a nitride, a boride or an oxide.

8. Method according to claim 7, characterized in that the carbide ceramic material is bombarded with nitrogen ions N to form a carbonitride.

9. Method according to claim 8, characterized in that the ceramic material is a titanium carbide TiC or a silicon carbide SiC, and in that the product obtained after bombardment is titanium carbonitride TiCN, or silicon carbonitride SiCN respectively.

10. Method according to claim 7, characterized in that the nitride ceramic material is bombarded with an ion dose comprised between $1*10^{16}$ $cm^{-2}$ and $1*10^{17}$ $cm^{-2}$.

11. Method according to claim 10, characterized in that the ceramic material is a silicon nitride $Si_3N_4$.

12. Method according to claim 7, characterized in that the oxide ceramic material is bombarded with nitrogen ions to form an oxynitride.

13. Method according to claim 12, characterized in that the ceramic material is zirconia $ZrO_2$ or alumina $Al_2O_3$, and in that the product obtained after bombardment is zirconia nitride $Zr_xO_yN_z$, or zirconium nitride ZrN, or aluminium oxynitride $Al_xO_yN_z$.

14. Method according to claim 7, characterized in that the oxide ceramic material is bombarded with carbon ions to form a oxycarbide.

15. Method according to claim 14, characterized in that the ceramic material is zirconia $ZrO_2$ or alumina $Al_2O_3$, and in that the product obtained after bombardment is zirconia carbide $ZrO_2C$, or zirconium carbide ZrC respectively.

16. Method according to claim 7, characterized in that the oxide ceramic material is bombarded with boron ions to form an oxyboride, or zirconia boride $ZrO_2B$.

17. Method according to claim 16, characterized in that, if the ion bombardment is continued for a sufficiently long time, zirconium diboride $ZrB_2$ is obtained.

18. Method according to claim 1, characterized in that the ion implantation process is of the electron cyclotron resonance ECR type.

19. Method according to claim 18, characterized in that the implanted ion dose is comprised between $1.10^{14}$ and $5.10^{17}$ions. $cm^{-2}$, or between $1.10^{16}$ and $1.10^{17}$ions. $cm^{-2}$.

20. Method according to claim 18, characterized in that the ions penetrate the particles forming the ceramic material powder to a depth corresponding to 20% of the dimension of said particles.

21. Material in powder form formed of a plurality of particles having a ceramic external layer and a ceramic core, said particles having a generally polyhedral shape, the external layer corresponding to a boride, a carbide or a nitride of the ceramic material from which the core of the ceramic powder particles is made.

22. Material according to claim 21, characterized in that 50% of the particles have a dimension smaller than 2 micrometres.

23. Material according to claim 22, characterized in that the dimension of the ceramic powder particles used is comprised between 1.2 micrometres and 63 micrometres.

24. Material according to any of claims 21 to 23, characterized in that the ceramic material from which the ceramic powder particles are made is a boride, a carbide, oxide or a nitride.