CLAIMS

1. Use of a nanoparticle or nanoparticles' aggregate in the manufacture of a medicament for enhancing brain performances or for the prevention or treatment of pathological stress in a subject when the nanoparticle or nanoparticles' aggregate is exposed to an electric field, wherein the nanoparticle's or nanoparticles' aggregate's material is selected from a conductor material, a semiconductor material, an insulator material with a dielectric constant ε_{ijk} equal to or above 200, and an insulator material with a dielectric constant ε_{ijk} equal to or below 100.

2. The use according to claim 1, wherein the electric field is applied through transcranial electric stimulation or transcranial magnetic stimulation.

3. The use according to claim 1 or 2, wherein the nanoparticle's or nanoparticles' aggregate's material is a conductor material selected from a metal having a standard reduction potential E° above 0.2 and an organic material having contiguous sp2 hybridized carbon centers in its structure.

4. The use according to claim 3, wherein the nanoparticle's or nanoparticles' aggregate's material is selected from a metallic nanoparticle wherein the metallic element is Ir, Pd, Pt, Au, or a mixture thereof, and an organic nanoparticle consisting of polyaniline, polypyrrole, polyacetylene, polythiophene, polycarbazole and/or polypyrene.

5. The use according to claim 1 or 2, wherein the nanoparticle's or nanoparticles' aggregate's material is a semiconductor material with a band gap Eg below 3.0 eV.

6. The use according to claim 5, wherein the nanoparticle's or nanoparticles' aggregate's material consists of an element from group IVA of the Mendeleev's periodic table, or in a mixed composition of elements from group III and V of the Mendeleev's periodic table, or in a mixed composition of elements from group II and VI of the Mendeleev's periodic table.

7. The use according to claim 6, wherein the nanoparticle's or nanoparticles' aggregate's material consists of an element from group IVA of the Mendeleev's periodic table and is doped with a charge carrier selected from Al, B, Ga, In and P.

8. The use according to claim 1 or 2, wherein the material is an insulator material with a band gap Eg equal to or above 3.0 eV and the relative dielectric constant ε_{ijk} is measured between 20°C and 30°C and between 10^2 Hz up to the infrared frequency.

9. The use according to claim 8, wherein the material is an insulator material with a band gap Eg equal to or above 3.0 eV and the relative dielectric constant ε_{ijk} is equal to or above 200 and the material of the nanoparticle or nanoparticles' aggregate is a dielectric material which is a mixed-metal oxide selected from $BaTiO_3$, $KTaNbO_3$, $KTaO_3$, $SrTiO_3$ and $BaSrTiO_3$.

10. The use according to claim 8, wherein the material is an insulator material with a band gap Eg equal to or above 3.0 eV and the relative dielectric constant ε_{ijk} is equal to or below 100 and the material of the nanoparticle or nanoparticles' aggregate is a dielectric material which is selected from a metal oxide, a mixed metal oxide, the metallic element of which is from period 3, 5 or 6 of the Mendeleev's periodic table or a lanthanide, and a carbon material.

11. The use according to anyone of claims 1 to 10, wherein the nanoparticle or nanoparticles' aggregate is for enhancing physical performances, or in enhancing learning, memorizing, sense perception, attention and/or decision making of a subject.

12. Use of a composition in the manufacture of a medicament for enhancing brain performances or in prevention or treatment of pathological stress in a subject exposed to an electric field, wherein the composition comprises nanoparticles and/or nanoparticles' aggregates and a pharmaceutically acceptable support, and wherein the nanoparticle's or nanoparticles' aggregate's material is selected from a conductor material, a semiconductor material, an insulator material with a dielectric constant ε_{ijk} equal to or above 200, and an insulator material with a dielectric constant ε_{ijk} equal to or below 100.

13. The use of claim 12, wherein the composition comprises at least two distinct nanoparticles and/or nanoparticles' aggregates, each nanoparticle or nanoparticles' aggregate consisting of a distinct material selected from a conductor material, a semiconductor material, an insulator material with a dielectric constant ε_{ijk} equal to or above 200 and an insulator material with a dielectric constant ε_{ijk} equal to or below 100.

14. A kit comprising at least two distinct nanoparticles and/or nanoparticles' aggregates, each nanoparticle or nanoparticles' aggregate consisting of a distinct material selected from a conductor material, a semiconductor material, an insulator material with a dielectric constant ε_{ijk} equal to or above 200 and an insulator material with a dielectric constant ε_{ijk} equal to or below 100.

15. The kit according to claim 14 for enhancing brain performances or in prevention or treatment of pathological stress in a subject.