CLAIMS

1. A near-infrared shielding material fine particle dispersion body in which near-infrared shielding material fine particles are dispersed in a solid medium,

wherein the near-infrared shielding material fine particles are composite tungsten oxide fine particles containing a hexagonal crystal structure,

a lattice constant of the composite tungsten oxide fine particles is 7.3850 Å or more and 7.4186 Å or less on the a-axis, and 7.5600 Å or more and 7.6240 Å or less on the c-axis,

a crystallite size of the composite tungsten oxide fine particles is in a range of 10 nm or more and 40 nm or less, and

a particle size of the near-infrared shielding material fine particles is 100 nm or less.

2. The near-infrared shielding material fine particle dispersion body according to claim 1, wherein the lattice constant of the composite tungsten oxide fine particles is 7.4031 Å or more and 7.4111 Å or less on the a-axis, and 7.5891 Å or more and 7.6240 Å or less on the c-axis.

3. The near-infrared shielding material fine particle dispersion body according to claim 1, wherein the lattice constant of the composite tungsten oxide fine particles is 7.4031 Å or more and 7.4186 Å or less on the a-axis, and 7.5830 Å or more and 7.5950 Å or less on the c-axis.

4. The near-infrared shielding material fine particle dispersion body according to any one of claims 1 to 3, wherein the particle size of the near-infrared shielding material fine particles is 10 nm or more and 100 nm or less.

5. The near-infrared shielding material fine particle dispersion body according to any one of claims 1 to 4, wherein the composite tungsten oxide fine particles are expressed by a general formula $M_xW_yO_z$, wherein M element is one or more elements selected from the group consisting of H, He, alkali metal, alkaline earth metal, rare earth element, Mg, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Al, Ga, In, Tl, Si, Ge, Sn, Pb, Sb, B, F, P, S, Se, Br, Te, Ti, Nb, V, Mo, Ta, Re, Be, Hf, Os, Bi, and I, W is tungsten, O is oxygen, and satisfying $0.20 \leq x / y \leq 0.37$, and $2.2 \leq z / y \leq 3.0$.

6. The near-infrared shielding material fine particle dispersion body according to claim 5, wherein the M element is one or more elements selected from Cs and Rb.

7. The near-infrared shielding material fine particle dispersion body according to any one of claims 1 to 6, wherein a surface of each near-infrared shielding material fine particle is coated with an oxide containing one or more elements selected from Si, Ti, Zr and Al.

8. The near-infrared shielding material fine particle dispersion body according to any one of claims 1 to 7, wherein the solid medium is resin or glass.

9. The near-infrared shielding material fine particle dispersion body according to

claim 8, wherein the resin is one or more kinds selected from polyethylene resin, polyvinyl chloride resin, polyvinylidene chloride resin, polyvinyl alcohol resin, polystyrene resin, polypropylene resin, ethylene vinyl acetate copolymer, polyester resin, polyethylene terephthalate resin, fluororesin, acrylic resin, polycarbonate resin, polyimide resin, and polyvinyl butyral resin.

10. A near-infrared shielding body, wherein the near-infrared shielding material fine particle dispersion body of any one of claims 1 to 9 is formed into any one selected from a plate shape, a film shape, and a thin film shape.

11. A near-infrared shielding laminated structure, wherein the near-infrared shielding material fine particle dispersion body of any one of claims 1 to 9 is present between two or more laminated plates selected from a plate glass, a plastic plate, and a plastic plate containing fine particles having a solar radiation shielding function.

12. A method for producing a near-infrared shielding material fine particle dispersion body, comprising:

a first step of producing composite tungsten oxide containing a hexagonal crystal structure expressed by a general formula $M_xW_yO_z$, wherein M element is one or more elements selected from the group consisting of H, He, alkali metal, alkaline earth metal, rare earth element, Mg, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Al, Ga, In, Tl, Si, Ge, Sn, Pb, Sb, B, F, P, S, Se, Br, Te, Ti, Nb, V, Mo, Ta, Re, Be, Hf, Os, Bi, and I, W is tungsten, O is oxygen, and satisfying $0.20 \leq x / y \leq 0.37$, and $2.2 \leq z / y \leq 3.0$;

a second step of producing composite tungsten oxide fine particles by mechanically pulverizing the composite tungsten oxide obtained in the first step, in which a lattice constant in the hexagonal crystal structure is 7.3850 Å or more and 7.4186 Å or less on the a-axis, and 7.5600 Å or more and 7.6240 Å or less on the c-axis, a crystallite size is in a range of 10 nm or more and 40 nm or less, and a particle size is 100 nm or less; and

a third step of dispersing in a solid medium the composite tungsten oxide fine particles obtained in the second step, to obtain a near-infrared shielding material fine particle dispersion body.

13. The method for producing a near-infrared shielding material fine particle dispersion body according to claim 12, wherein in the second step, composite tungsten oxide fine particles are produced, in which the lattice constant in the hexagonal crystal structure is 7.4031 Å or more and 7.4111 Å or less on the a-axis and 7.5891 Å or more and 7.6240 Å or less on the c-axis, a crystallite size is in a range of 10 nm or more and 40 nm or less, and the particle size is 100 nm or less.

14. The method for producing a near-infrared shielding material fine particle dispersion body according to claim 12, wherein in the second step, composite tungsten oxide fine particles are produced, in which the lattice constant in the hexagonal crystal structure is 7.4031 Å or more and 7.4186 Å or less on the a-axis and 7.5830 Å or more and 7.5950 Å or less on the c-axis, a crystallite size is in a range of 10 nm or more and 40 nm or less, and the particle size is 100 nm or less.

15. The method for producing a near-infrared shielding material fine particle dispersion body according to any one of claims 12 to 14, wherein the solid medium is resin or glass.

16. The method for producing a near-infrared shielding material fine particle dispersion body according to claim 15, wherein the resin is one or more kinds selected from polyethylene resin, polyvinyl chloride resin, polyvinylidene chloride resin, polyvinyl alcohol resin, polystyrene resin, polypropylene resin, ethylene vinyl acetate copolymer, polyester resin, polyethylene terephthalate resin, fluororesin, acrylic resin, polycarbonate resin, polyimide resin, and polyvinyl butyral resin.

17. The method for producing a near-infrared shielding material fine particle dispersion body according to claims 12 to 16, wherein the third step further includes a fourth step of forming the near-infrared shielding material fine particle dispersion body into any one selected from a plate shape, a film shape, and a thin film shape.

18. The method for producing a near-infrared shielding material fine particle dispersion body according to claim 17, wherein the fourth step includes a step of forming the near-infrared shielding material fine particle dispersion body on a substrate surface.

19. A method for producing a near-infrared shielding laminated structure, including a fifth step of sandwiching the near-infrared shielding material dispersion body obtained in the method for producing a near-infrared shielding material fine particle dispersion

body of claim 17 or 18, between two or more opposed transparent substrates selected from a sheet glass, a plastic, and a plastic containing fine particles having a solar shielding function.