Claims

[Claim 1]
A heteroatom-doped nanodiamond,
the heteroatom-doped nanodiamond being doped with at least one heteroatom,
the heteroatom-doped nanodiamond satisfying requirement (i) and/or (ii) below:
(i) a BET specific surface area being from 20 to 900 m^2/g, and
(ii) an average size of primary particles being from 2 to 70 nm,
wherein a ratio (D/G) of a peak area (D) of diamond to a peak area (G) of graphite by Raman spectroscopy is from 0.2 to 9.

[Claim 2]
The heteroatom-doped nanodiamond according to claim 1, wherein the heteroatom comprises at least one selected from the group consisting of Group 14 elements, phosphorus, and boron.

[Claim 3]
The heteroatom-doped nanodiamond according to claim 1 or 2, wherein the heteroatom-doped nanodiamond has a fluorescence emission peak.

[Claim 4]
The heteroatom-doped nanodiamond according to claim 3, wherein the fluorescence emission peak is originated from at least one heteroatom-vacancy center.

[Claim 5]
The heteroatom-doped nanodiamond according to any one of claims 1 to 4, wherein the heteroatom-doped nanodiamond emitting fluorescence is further doped with phosphorus and/or boron.

[Claim 6]
The heteroatom-doped nanodiamond according to any one of claims 1 to 5, wherein the heteroatom-doped nanodiamond has a fluorescence emission peak at from 720 to 770 nm, and the heteroatom comprises silicon.

[Claim 7]
The heteroatom-doped nanodiamond according to any one of claims 1 to 5, wherein the heteroatom-doped nanodiamond has a fluorescence emission peak at from 580 to 630 nm, and the heteroatom comprises germanium.

[Claim 8]
The heteroatom-doped nanodiamond according to any one of claims 1 to 5, wherein the heteroatom-doped nanodiamond has a fluorescence emission peak at from 590 to 650 nm, and the heteroatom comprises tin.

[Claim 9]
The nanodiamond according to any one of claims 1 to 5, wherein the nanodiamond has a fluorescence emission peak at from 540 to 600 nm, and the heteroatom comprises lead.

[Claim 10]
The heteroatom-doped nanodiamond according to any one of claims 1 to 9, which produces fluorescence due to a nitrogen-vacancy (N-V) center.

[Claim 11]
The heteroatom-doped nanodiamond according to any one of claims 1 to 10, wherein a shape of the nanodiamond is spherical, ellipsoidal, or polyhedral.

[Claim 12]
The heteroatom-doped nanodiamond according to any one of claims 1 to 11, wherein a carbon content is from 70 to 99 mass%, a hydrogen content is from 0.1 to 5 mass%, and a nitrogen content is from 0.1 to 5 mass%.

[Claim 13]
The heteroatom-doped nanodiamond according to any one of claims 1 to 12, wherein a ratio (H/D) of a peak area (H) of a surface hydroxy group (OH) to a peak area (D) of diamond by Raman spectroscopy is from 0.1 to 5.

[Claim 14]
The heteroatom-doped nanodiamond according to any one of claims 1 to 13, wherein a ratio (C/D) of a peak area (C) of a surface carbonyl group (CO) to a peak area (D) of diamond by Raman spectroscopy is from 0.01 to 1.5.

[Claim 15]
The heteroatom-doped nanodiamond according to any one of claims 1 to 14, comprising at least one oxygen-containing functional group terminal and/or at least one hydrogen-containing functional group terminal.

[Claim 16]
The heteroatom-doped nanodiamond according to any one of claims 1 to 15, wherein a concentration of the at least one heteroatom-vacancy center is 1×10^{10} /cm^3 or greater.