CLAIMS

1. A doped quartz glass component for use in a plasma-assisted manufacturing process, in particular in semiconductor manufacture, containing at least one dopant which is capable of reacting with fluorine to form a fluoride compound, wherein the fluoride compound has a boiling point higher than that of SiF_4, characterised in that the doped quartz glass has a microhomogeneity defined by (a) a surface roughness with an R_a value of less than 20 nm after the surface has been subjected to a dry-etching procedure as specified in the description, and/or (b) a dopant distribution with a lateral concentration profile in which maxima of the dopant concentration are at an average distance apart of less than 30 µm.

2. The component according to claim 1, characterised in that the surface has an R_a value of less than 15 nm and/or the maxima of the dopant concentration are at an average distance apart of less than 20 µm.

3. The component according to claim 1 or 2, characterised in that the dopant or dopants are present in a total dopant concentration ranging from 0.1 wt.% to 5 wt.%, preferably in a total dopant concentration ranging from 0.5 to 3 wt.%.

4. The component according to one of the preceding claims, characterised in that the doped quartz glass contains at least one dopant compound with a dopant selected from the group consisting of: Al, Sm, Eu, Yb, Pm, Pr, Nd, Ce, Tb, Gd, Ba, Mg, Y, Tm, Dy, Ho, Er, Cd, Co, Cr, Cs, Zr, In, Cu, Fe, Bi, Ga and Ti.

5. The component according to claim 2 and claim 4, characterised in that aluminium is the dopant and Al_2O_3 is the dopant compound, and in that the total dopant concentration is in the range of 0.5 to 3 wt.%.

6. The component according to one of the preceding claims, characterised in that the doped quartz glass is made from synthetically produced SiO_2 raw materials.

7. A method of producing a doped quartz glass component according to one of claims 1 to 6, for use in a plasma-assisted manufacturing process, comprising the following method steps:

(a) providing a slip containing SiO_2 particles in an aqueous liquid,

(b) providing a doping solution containing a solvent and at least one dopant in dissolved form,

(c) bringing together doping solution and slip to form a dispersion, in which a solid containing the dopant is precipitated,

(d) drying the dispersion to form granular particles containing SiO_2 and the dopant, and

(e) sintering or fusing the granular particles to form the doped quartz glass component,

characterised in that the SiO_2 particles in the slip are aggregates or agglomerates of SiO_2 primary particles and have an average particle size of less than 30 µm, wherein the SiO_2 primary particles are produced pyrogenically and preferably have an average particle size of less than 100 nm.

8. The method according to claim 7, characterised in that for bringing together the doping solution and slip, the doping solution is atomised to form a spray mist and this is supplied to the dispersion.

9. The method according to claim 7 or 8, characterised in that when the doping solution and slip are brought together, the latter is kept in motion.

10. The method according to one of claims 7 to 9, characterised in that before the doping solution and slip are brought together, the latter is adjusted to a pH value greater than 12.

~~11. The method according to one of claims 7 to 10, characterised in that the SiO_2 primary particles are produced pyrogenically and preferably have an average particle size of less than 100 nm.~~

~~12.~~ 11. The method according to one of claims 7 to 10, characterised in that the sintering of the granular particles takes place in a nitrogen-containing atmosphere by gas pressure sintering.