Claims

1. A method for preventing or reducing the formation, accumulation, or both of deposits in an ion source component of an ion implanter, wherein said ion source component comprises an ionization chamber and one or more components contained within said ionization chamber, said method comprising:

introducing into said ionization chamber a dopant gas, wherein said dopant gas has a composition to prevent or reduce the formation of fluorine ions/radicals during ionization; and

ionizing said dopant gas under the conditions to prevent or reduce the formation, accumulation, or both of deposits on the interior of said ionization chamber, on said one or more components contained within said ionization chamber, or on both,

wherein the dopant gas comprises (i) a hydrogen containing fluorinated composition selected from monofluorosilane (SiH_3F), difluorosilane (SiH_2F_2), and trifluorosilane ($SiHF_3$), (ii) a hydrocarbon containing fluorinated composition selected from difluoromethane (CH_2F_2), and trifluoromethane (CHF_3), (iii) a hydrocarbon containing hydride composition selected from monomethylsilane ($Si(CH_3)H_3$), dimethylsilane ($Si(CH_3)_2H_2$), and trimethylsilane ($Si(CH_3)_3H$), (iv) a halide containing composition other than a fluorinated composition, said halide containing composition selected from monochlorosilane (SiH_3Cl), dichlorosilane (SiH_2Cl_2), trichlorosilane ($SiCl_3H$), silicon tetrachloride ($SiCl_4$), dichlorodisilane ($Si_2Cl_2H_4$), chloromethane (CH_3Cl), dichloromethane (CH_2Cl_2), trichloromethane ($CHCl_3$), and carbon tetrachloride (CCl_4), or (v) a halide containing composition comprising a fluorine and a non-fluorine containing halide, said halide containing composition selected from chlorotrifluoromethane ($CClF_3$), dichlorodifluoromethane (CCl_2F_2) , trichlorofluoromethane (CCl_3F), bromotrifluoromethane ($CBrF_3$), and dibromodifluoromethane (CBr_2F_2).

2. A method for the implantation of ions into a target, said method comprising:

a) providing an ion implanter having an ion source component, wherein said ion source component comprises an ionization chamber and one or more components contained within said ionization chamber;

b) providing an ion source reactant gas for providing a source of ion species to be implanted, wherein said ion source reactant gas has a composition to prevent or reduce the formation of fluorine ions/radicals during ionization;

c) introducing the ion source reactant gas into the ionization chamber;

d) ionizing the ion source reactant gas in the ionization chamber under conditions to prevent or reduce the formation, accumulation, or both of deposits on the interior of said ionization chamber, on said one or more components contained within said ionization chamber, or on both, to form ions to be implanted; and

e) extracting the ions to be implanted from said ionization chamber and directing them to said target

wherein the ion source reactant comprises (i) a hydrogen containing fluorinated composition selected from monofluorosilane (SiH_3F), difluorosilane (SiH_2F_2), and trifluorosilane ($SiHF_3$), (ii) a hydrocarbon containing fluorinated composition selected from difluoromethane (CH_2F_2), and trifluoromethane (CHF_3), (iii) a hydrocarbon containing hydride composition selected from monomethylsilane ($Si(CH_3)H_3$), dimethylsilane ($Si(CH_3)_2H_2$), and trimethylsilane ($Si(CH_3)_3H$), (iv) a halide containing composition other than a fluorinated composition, said halide containing composition selected from monochlorosilane (SiH_3Cl), dichlorosilane (SiH_2Cl_2), trichlorosilane ($SiCl_3H$), silicon tetrachloride ($SiCl_4$), dichlorodisilane ($Si_2Cl_2H_4$), chloromethane (CH_3Cl), dichloromethane (CH_2Cl_2), trichloromethane ($CHCl_3$), and carbon tetrachloride (CCl_4), or (v) a halide containing composition comprising a fluorine and a non-fluorine containing halide, said halide containing composition selected from chlorotrifluoromethane ($CClF_3$), dichlorodifluoromethane (CCl_2F_2) , trichlorofluoromethane (CCl_3F), bromotrifluoromethane ($CBrF_3$), and dibromodifluoromethane (CBr_2F_2).

3. The method of claim 2 wherein said deposits comprise tungsten from said ionization chamber, from said one or more components contained within said ionization chamber, or from both.