Special Feature of Forming Solid Planar Diffusion a Source for Submicron Structure

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Abstract - **Solid planar diffusion a source for forming submicron structure VLSI are given in this paper.**

Keywords - **silane, borazine, ionic-plasma processing technique.**

One of the basic ways of integrated circuit structures production is diffused technique of doped oxide layers which are formed on a silicon surface with use different deposition technique: gas deposition, low temperature oxidizing of silane (disilane) and hydrides of dopant impurities, from film-maker soluble compositions, with use of solid planar sources which contain doped oxide which allocate directly in a reaction zone at temperature of diffusion-oxidizing processes [1].

A method of borosilicate glass forming on a silicon surface with use of wafer from boron nitride with the oxidized surface was got with a wide dissemination in serial procedure. Stability of such source is defined by hygroscopic properties of a surface. The ionic-plasma processing technique widely are used in submicron processing structures forming technique of the large-scale integrated circuit today which allows to deposition high-quality dielectric films: SiO_2, PSG (phosphorus silicate glass), BPSG (boron-phosphorus silicate glass), Si_3N_4, $Si_xO_yN_z$, SiC and others. On the basis of a high-frequency ionic-plasma deposition technique of dielectric films we develop depositing process of boron-nitride films on silicon linings of the big diameter > 150 mm which can be used as solid planar diffusion sources high hour and temperature stability. In this method process of depositing BN is conducted from the directed ionic-plasma streams with use of two separate streams by means of ionic-plasma sources of type "Radical" or "Istra", one of which is formed with products of dissociation, excitation and ionization of composition – borazine ($B_3N_3H_6$), and the second – is as a wattless reagent which is a basis of nitric plasma, is gaseous nitrogen N_2. The ratio of streams borazine and nitrogen is $I_B : I_{N_2} = 1:2$ and the dielectric insight $\varepsilon = 3.5 - 3.55$ provides a cubic phase, for which density of film of 3,5 nm/sm^3. Energy of ions in sources changes within the limits 0,3-2,5 keV, and the density of an ionic current for borazine and nitrogen streams are within the limits 0.5-1.2 mA/sm^2. Diffusion source activation is done at T=800°C before each diffusion process during 15-30 sec. Temperature film deposition of boron nitride at this way does not exceed 100°C. The same method, but with use already three ionic-plasma sources it is possible to form three-componental glass – boron-phosphorus silicate.

REFERENCES

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