

Semiconductor Glossary

*A Resource for
Semiconductor
Community*

Second Edition

Jerzy Ruzyllo



World Scientific

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dopant redistribution term typically refers to the possible undesired, or induced on purpose, changes in the dopant profile during the high-temperature treatments to which semiconductor wafer may be subjected; driven by the dopant diffusion in the direction of the concentration gradient; in the case dopant redistribution is not desired only low thermal budget thermal treatments should be employed.

limited-source diffusion, RTA, thermal budget

dopants in silicon see *dopant*.

doping process of dopant introduction into semiconductor for the purpose of altering its electrical characteristics; allows control of the resistivity/conductivity of semiconductor by several orders of magnitude; also used to convert *p*-type material into *n*-type material and vice versa.

diffusion, ion implantation

doping by diffusion process of semiconductor doping carried out by means of thermal diffusion.

diffusion

doping by ion implantation process of semiconductor doping carried out by means of ion implantation.

ion implantation

doping during material growth establishing of the desired dopant concentration/conductivity type of semiconductor material by introducing dopant atoms during its formation process.

Czochralski crystal growth, epitaxy

dose typically understood as implantation dose; number of ions crossing one cm^2 of the surface of the implanted solid; unit ions/cm^2 ; controlled by ion beam current and implantation time; higher the dose, higher the concentration of implanted ions.

ion implantation, implantation dose

double (dual) gate an approach to the implementation of the MOSFET in which gate structure (gate oxide and gate contact) is formed on two sides of

ionization, ion multicharged, ion single-charge

ion beam a geometrically confined and accelerated by electrostatic forces stream of ions directed toward desired target.

ion implantation, ion milling

ion beam current expressed in terms of the number of ions crossing unit area in the unit time; a key parameter determining implantation dose in the process of ion implantation; a parameter used as a criterion distinguishing between various types of implanters.

ion implantation, implantation dose, implanter, high-current implanter

ion beam lithography, IBL a lithography technique in which resist is exposed by accelerated ions; direct write or masked lithography; due to the limited scattering of ions in the resist the IBL may offer resolution of the pattern transfer process comparable to, or better than e-beam lithography; not used in commercial manufacturing due to the complexity of the ion optics infrastructure.

e-beam lithography, proximity effect, direct write lithography

ion implantation a process in which ions accelerated toward the solid surface penetrate the solid up to certain depth determined by the kinetic energy of impinging ions; in semiconductor technology used to introduce dopants, to form buried layers, and to modify solid surfaces; the most common selective doping technique in semiconductor device manufacturing; concentration of implanted dopant atoms depends on the ion dose while depth of implantation is determined by the kinetic energy of ions impinging on the surface.

doping, dose, implanter, projected range, selective doping

ion implantation damage see *implantation damage*.

ion milling subtractive process in which high energy ions impinging on the surface of the solid cause ejection (“sputtering”) of the host atoms; highly anisotropic, non-selective and surface damaging etching.

etching, physical etching, sputtering, selective etch, anisotropic etch