

Microelectronic Definitions

Engr 1202 ECE Lab

Semiconductor – A material whose electrical conductivity and resistivity is between a conductor and an insulator. It will conduct electrical current under certain conditions. A material that exhibits relatively high resistance in a pure state and a much lower resistance when it contains small amounts of certain impurities. Silicon is the most common semiconductor material.

Conductor – Material suitable for carrying electrical current or having low resistivity ($<10^{-4}\Omega/\text{cm}$).

Insulator - A nonconducting material with a high resistivity used to support or separate conductors. Made from materials with a resistivity greater than $10^5\Omega/\text{cm}$. Silicon dioxide (SiO_2) is an insulator.

Dielectric – An insulating medium or material that does not conduct electricity.

Conductivity – The ability of a material to conduct electrical or thermal energy.

Resistivity – The characteristic of a material that resists the passage of electrical current either through its bulk or on its surface. The unit of volume resistivity is the $\Omega\text{-cm}$, and the unit of surface resistivity is the $\Omega/(\text{unit area})$.

Noble metals – Metals that are highly resistant to corrosion or oxidation. Gold and platinum are noble metals.

Thin film deposition – A process in which electronic materials are deposited on a substrate under high vacuum conditions.

Evaporation – The thin film deposition of a material in vacuum on a substrate by vaporization.

Oxidation – A process in which a material reacts with oxygen in the atmosphere to form an oxide such as silicon and oxygen forming SiO_2 .

Photolithography - The transfer of a pattern or image from one medium (mask) to another (wafer) using light. It is considered *microlithography* if the images have features in the micrometer (μm) range.

Photolithography Etch – The process in which a pattern is formed by exposing a photosensitive (light) material through a mask of the pattern and etching away the part of the film that was not protected by the photosensitive material.

Mask – A glass photographic plate, thin metal sheet, photographic negative/positive (or laser print on transparency) containing the circuit patterns used for making microelectronic devices.

Etching – The dissolving of a material.

Die – A single square or rectangular piece of semiconductor material into which a specific circuit or device has been fabricated. The plural is dice. It may also be called a chip.

Dicing – The cutting of a semiconductor wafer into individual die or chips using a precision diamond saw.