Know these terms as they apply to ELEC 424

Melt – a quantity of molten ultra-high purity material from which a large single crystal will be grown.

Seed crystal – a small piece of single crystal material from which a large crystal of, usually, the same material is to be grown.

Boule – a single crystal ingot produced by synthetic means.

Wafer – precisely polished flats cut from the boule, which microcircuits are constructed

Substrate – the material upon which semiconductor devices are fabricated.

Photolithography – a photographic method of pattern definition employing ultraviolet radiation to form complex circuitry on a semiconductor wafer.

Masks or reticles – transparent plates with images to be patterned onto the wafer by photolithography.

Photoresist – an ultraviolet light sensitive organic material or photoemulsion dispensed as a liquid onto the wafer surface to allow an image to be exposed and developed on the wafer.

Positive Photoresist – forms the same image on photoresists as on the mask. The developer removes the exposed areas of a positive resist. Positive photoresist is normally preferred in high resolution applications.

Negative Photoresist – forms the negative of the mask on the photoresist. The developer removes the non-exposed areas of a negative resist.

Doping - the process of intentionally introducing impurities into an extremely pure (also referred to as *intrinsic*) semiconductor in order to change its electrical properties

Diffusion- a high-temperature process of introducing dopant atoms into a semiconductor crystal lattice during which dopant atoms (impurities) distribute themselves in accordance with the second law of thermodynamics.

Ion implantation - the most common technique of dopant introduction in advanced semiconductor manufacturing during which ions are accelerated toward solid surface and penetrate the solid up to certain depth determined by ion energy

Plasma etching - dry etching in which semiconductor wafer is immersed in plasma containing etching species

Field oxide or field dielectric - relatively thick oxide (typically 100 - 500 nm) formed to passivate and protect semiconductor surface outside of active device area; part of any semiconductor device, but does not participate in device operation.

Gate oxide or gate dielectric - a layer of very thin oxide sandwiched between semiconductor and gate contact in MOS devices; can be as thin as 1 nm in advance silicon digital integrated circuits and as thick as 70 nm in discrete power MOSFETs; typically thermally grown SiO_2

Vias – conducting pathways cut through insulating layers of a integrated circuit or printed wiring board device.