



# Chemical Vapor Deposition

**Klaus-Hermann Dahmen**

*Florida State University*

- I. Evolution of CVD
- II. Comparison Between CVD and Other Thin Film Deposition Techniques
- III. CVD Apparatus
- IV. Fundamentals of CVD
- V. Techniques of Preparing CVD Films
- VI. Materials Fabricated by CVD

## GLOSSARY

**Adsorption** Chemisorption is the chemical binding of a molecule to a surface involving the transfer of electrons. Physisorption is the physical binding of a molecule to a surface involving electrostatic attraction or van der Waals forces.

**Chemical vapor deposition (CVD)** A chemical process in which a carrier gas and/or diffusion transports a volatile precursor to a reaction zone where the precursor can either react with other reaction gases or decompose resulting in the formation of a solid thin film on a substrate and gaseous by-products.

**Evaporation** A physical vaporization deposition (PVD) technique in which the evaporated bulk material condenses onto the substrate in high vacuum.

**Interconnects** Conducting metal lines that connect devices to each other and to an external power supply.

**Molecular beam epitaxy** A physical vaporization deposition (PVD) technique in which the evaporation rate and deposition rate of an elemental source

are controlled with Knudsen cells under ultrahigh vacuum.

**Physical vaporization deposition (PVD)** A physical method of forming a thin film characterized by a bulk material being transported to the substrate's surface in vapor form whereby it condenses.

**Planar technology (also Planarization)** The process that allows the fabrication of flat and smooth surfaces. This is necessary for the subsequent deposition of conducting layers in order to avoid discontinuity in the conducting pathways.

**Precursor** A volatile compound that can be vaporized and transported to the substrate. It then either decomposes or reacts with another reactant resulting in a thin film on the substrate surface and gaseous by-products.

**Sputtering** A physical vaporization deposition (PVD) technique in which the bulk material is released into the vacuum by bombardment from an ion source. The material coalesces onto the substrate surface, thus forming a thin film.

**Substrate** A material surface upon which a thin film is deposited.