(D) Chemical Vapour Deposition :

In the 1930's increasing emphasis was laid on utilizing the CVD technique to prepare refractory compounds such as metal carbides, nitrides, silicides, borides, and oxides as well as sulphides, selenides, tellurides, intermetallic compounds, and alloys. CVD gained wide acceptance as a means of growing thin layers. The process has since been extended to deposit a vide variety of films, including insulators, conductors, resistors, varistors, and ferrites.

Chemical vapour deposition involves, essentially, exposure of the substrate to one or several vapourized compounds or reagents gases, some or all of which contain constituents of the desired deposited substance. A chemical reaction is then initiated at or near the substrate surface, producing the desired material of a solid phase reaction product which condenses on the substrate. The chemical

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reaction may be activated by the application of heat, an rf field , light or X-rays, an electrical arc, a glow discharge, electron bombardment or catalytic action of the substrate surface. It should be emphasised that the morphology of the deposited layer is strongly influenced by the nature of the chemical reaction and the activation mechanism. It is important to attain deposition conditions which enable the reaction to take place near or on the substrate surface (hetrogeneous reaction) in order to avoid powdery deposits, which result when the reaction occurs in the gas phase (homogeneous reaction).

The film growth in the CVD process takes place by an atom/molecule-by-atom/molecule condensation process. The growth process in many ways similar to that of physical vapour deposition process such as evaporation and sputtering, since in every case the deposit is formed from a vapour phase. A clear distinction between chemical vapour deposition and physical vapour deposition (PVD) process is that in CVD the formation of a film results from a hetrogeneous chemical reaction without involving a mean free path of the gas molecule larger than or comparable with the dimensions of the deposition chamber as a necessary condition for the deposition processes. However, CVD may be carried out at low pressures or in high vacuum, depending on the requirements.

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