

II. 3 “Mist Deposition in the Fabrication of Semiconductor Devices”

Unlike PVD and CVD processes, formation of thin films using liquid precursors by means of PLD (Physical Liquid Deposition) does not involve either vacuum ambient, or thermal stimulation. As such, PLD processes offer significant flexibility in terms of substrates used and benefits in terms of the cost of the process. During PLD, liquid precursor is physically applied to the solid surface and then solidified by low temperature curing which drive solvents out and leave solid film on the substrate’s surface. Spin-coating is the most common PLD technique. It is relatively simple to implement, works well in the variety of applications and as such is commonly used in semiconductor device manufacturing in photoresist and low-k dielectric deposition. However, it features some inherent shortcomings which limit its usefulness in the range of emerging applications.

The purpose of this presentation is to introduce and discuss a new method of thin film formation using liquid precursors called “mist deposition”. The mist deposition process is demonstrated as a method which extends the use of liquid precursors in semiconductor manufacturing in those applications in which usefulness of the spin-on process will be severely restricted. Principles of the method as well as properties of mist deposited films are discussed and different mist deposition applications, including high-k dielectric and organic semiconductors deposition are considered based on original experimental results.

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