OPTICAL PROBES OF ATMOSPHERIC PRESSURE CVD SYSTEMS

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KEYWORDS: In-situ monitoring, process control, diode laser spectroscopy, interferometry

ABSTRACT

This paper seeks to address the problems associated with the use of optical in-situ monitoring methods as applied to atmospheric pressure CVD systems in order to (a), gain some insight into the nature of the processes occurring and (b), to devise novel methods for on-line process control. A brief review of available methods is presented highlighting the advantages and disadvantages of each method in the context of CVD studies. Examples of the use of two specific methods, namely interferometry and near IR diode laser spectroscopy (NIRDLS) are given. The technique of interferometry is described using examples taken from our work on the growth of TiO_2 on silicon, see figure 1 below. The NIRDLS approach is illustrated using data obtained in our laboratories for the growth of SnO_2 on glass, see figure 2 below. Some conclusions are presented as to the likely applications of both methods in process control applications.

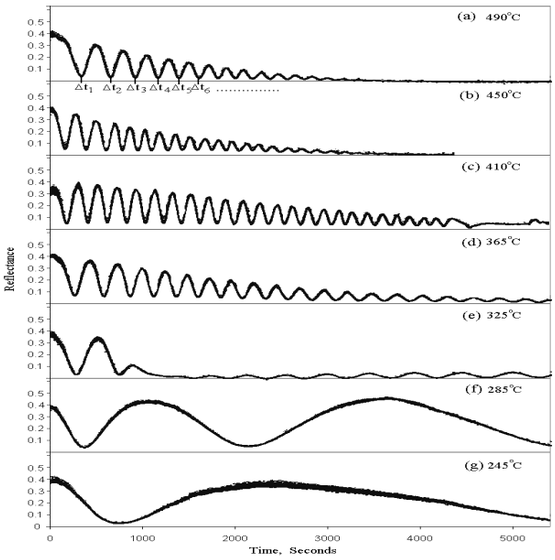

Figure 1, real-time interferometry data recorded from a Si (001) substrate during the direct liquid injection CVD growth of TiO_2 from titanium tetraisopropoxide, as a function of substrate temperature

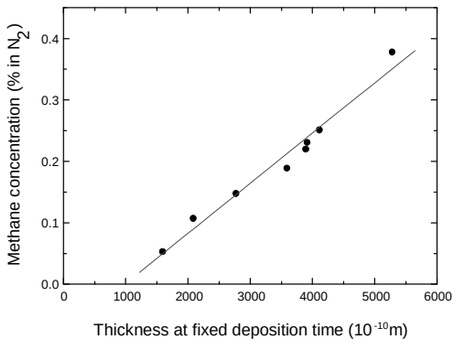

Figure 2, correlation between the thickness of a tin oxide coating grown onto a glass substrate by CVD and the level of by-product methane detected using a near-IR diode laser spectrometer operating in-situ, under growth conditions.