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4.1.2 DLC On Dome Configuration

A non-conformal curved geometry based on a 150mm hemispherical geometry was utilized to test modeled performance over a non-planar configuration. Again the three profiles shown in Figure 13 have been modeled with non-conformal geometry and used to calculate the deposition rate. The optimum case is shown in Figure 14 again with very uniform measured values.

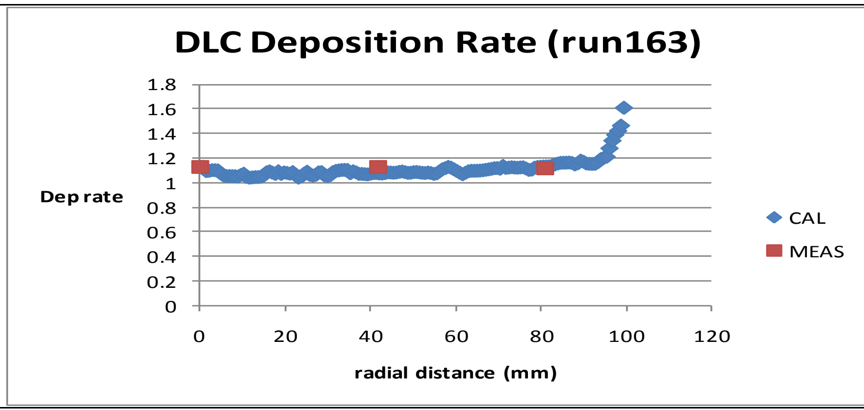

Figure 14 The measured and calculated deposition rates for DLC in a Non-Conformal (150mm radius hemisphere) substrate configuration for optimum deposition conditions. The grading is <0.7%

Figures 15a and b shows the dome within the deposition system.

(a) (b)

Figure 15 a) Dome geometry on lower electrode; b) Dummy dome configuration

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4.2 MOCVD SiO_2

Essentially the same procedure can be used for MOCVD although as mentioned above the temperature calculation is somewhat different, the constants are also different. Again uniform coatings are achievable over a wide area on the electrode as shown in Figure 16.

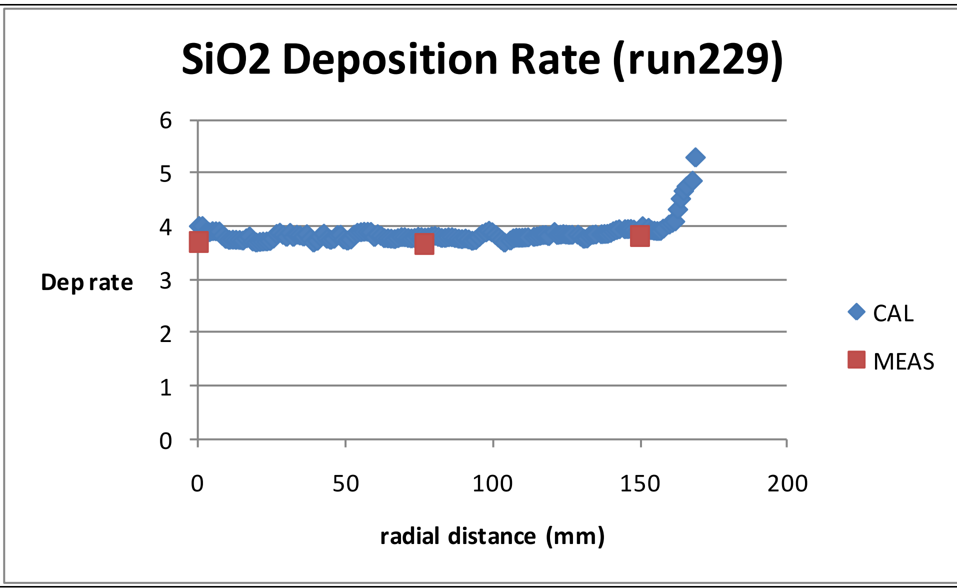

Figure 16 The measured and calculated deposition rates for MOCVD deposited SiO2 in parallel plate configuration. The grading for the middle and edge position relative to the centre are -0.9% (thin)and 3% (thick).

5.0 DISCUSSION

A modeling method for film thickness variation within plasma enhanced chemical vapor deposition (PECVD) processes. The model enables identification and optimization of deposition process sensitivities to electrode configuration, deposition system design and gas flow distribution.

The model specifically quantifies electric field distribution, plasma density, temperature profile and gas flow and relationship with film deposition rate and thickness variation across electrode geometry.

Excellent agreement between theory and experiment for reactive gas and MOCVD feedstock is demonstrated. Thickness uniformity <±1% over 300mm diameter electrode areas have been demonstrated. Such film thickness uniformity levels are required for optical coatings.

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