

Abstract Submitted  
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**Influence of chamber scaling on different level polymerizing processing gases** SANKET SANT, ERIC JOSEPH, BAOSUO ZHOU, LAWRENCE OVERZET, MATTHEW GOECKNER, University of Texas at Dallas — We have previously examined influence of chamber scaling (both diameter and source to chuck gap) on fluorocarbon film deposition/etch for  $\text{CF}_4$  plasmas<sup>1,2</sup>. In this paper, we extend those studies to more polymerizing fluorocarbon chemistry,  $\text{C}_4\text{F}_8$ . In  $\text{CF}_4$  discharges, film growth on unbiased substrates go from deposition to etch as the source to chuck gap increases. In  $\text{C}_4\text{F}_8$  discharges film growth occurs for all gaps and chamber diameters examined. It is found that ions play an important role in deposition with  $\text{CF}_4$  but not with  $\text{C}_4\text{F}_8$ . This difference may be attributed to the structures of the parent gases. Dissociation of a C-C bond in  $\text{C}_4\text{F}_8$  may result in an ‘unwrapping’ of the cyclic structure. When this radical fills an open bond site on a surface, a new site is created. On the other hand,  $\text{CF}_3$  will cap bond sites in  $\text{CF}_4$  plasmas. Thus ion impact is required for site formation in  $\text{CF}_4$  plasmas but not in  $\text{C}_4\text{F}_8$  plasmas.

<sup>1</sup>) EA Joseph, *et al.*, J. Vac. Sci. Technol. A 22 (3), May/June 2004

<sup>2</sup>)BS Zhou, et al., J. Vac. Sci. Technol. (submitted)

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