Modeling and simulation perspectives on surface chemistry control in atomic layer processing Tokyo Electron America Inc., Peter L.G. Ventzek E-mail: peter.ventzek@us.tel.com

Atomic later etch and deposition and their combination promise the escape of process tradeoffs (profile, selectivity, ARDE). Advanced logic and memory demand angstrom level control and pristine surfaces when fabricated for performance. Every surface is special. Processing one surface may require the active control of many other surfaces. Vertical processing allowed for passive control of sidewalls and mask structures using tried and true plasma chemistries with also passively controlled ion angles. 3D topographic structures do not allow this freedom. This presentation will include a realistic look at atomic layer processing and test a key assumption of atomic layer processing: self-limitation. Chamber scale simulation through to surface chemistry simulation approaches will be used to describe silicon material through organic material processing. Active control of surface states through novel use of ions will be shown as a means of topography control. A look forward to how modeling and simulation will help device and process aware manufacturing driven atomic layer processing closes the talk.