

Challenges in Wet Processing of High Aspect Ratio Nanostructures

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In semiconductor fabrication, as CMOS technology scaling continues along Moore's law, surfaces patterned with high aspect ratio structures inevitably bring more challenges for wet processing. The increased surface area has a big impact on interfacial properties such as surface wettability. Since gas bubbles trapped on nanostructured surfaces can reduce the effectiveness of wet processing, special care needs to be spent to ensure a complete wetting. Thus quantitative wetting characterization at the nanoscale is extremely important. In this talk, I'll first summarize our recent development of different optical, acoustic and ATF-FTIR based wetting characterization techniques, then discuss how materials and patterned structure profiles can affect the nanoscale wetting properties. Pattern collapse, as a result of capillary interactions between micro- or nano-structures, is another detrimental effect that needs to be avoided in order to increase production yields. Understanding the underlying mechanism behind complex aggregation patterns is extremely challenging because a great number of factors are involved. In this work, several critical issues which limit our understanding of pattern collapse phenomenon are discussed together with some recent results of experiment and modeling.

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