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Factors Affecting the Sealing Efficiency of Low-k Dielectric Surface Pores Using Successive He and Ar/NH_3 Plasma Treatment[1] JULINE SHOEB, Iowa State University, MARK KUSHNER, University of Michigan — Sequential treatment of porous SiCOH by He and NH_3 plasmas is effective at sealing pores while maintaining the low-k of the dielectric. He plasmas activate surface sites to accelerate the reactions responsible for pore sealing. Additional NH_3 plasma treatment completes the sealing through formation of Si-N, C-N and N-N bonds resulting from the adsorption of NH_x. To seal pores, sufficient He plasma exposure time is required to break Si-O bonds at SiO_2 sites and to activate pore lining CH_n groups by removal of H atoms. Sealing efficiency degrades if the pore radius is too large to link the sites of opposite pore walls by Si-N-N-C, Si-N-N-Si or C-N-N-C chains. In this talk, we discuss results from a computational investigation of the sealing efficiency of a porous carbon doped silica films (SiOCH). The Hybrid Plasma Equipment Model provided the fluxes of ions, neutrals and photons onto the surface from He and NH_3/Ar ICPs. The sealing mechanism was implemented in the Monte Carlo Feature Profile Model with which profiles of the low-$k$pores are predicted. Factors affecting the sealing efficiency, such as treatment time, bias, average pore radius and pore radius standard deviation will be discussed.

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