A METHOD FOR REDUCING ARGON DIFFUSION FROM HIGH DENSITY PLASMA FILMS

ABSTRACT

A two-step high density plasma-CVD process is described wherein the argon content in the film is controlled by using two different argon concentrations in the argon/silane/oxygen gas mixture used for generating the high density plasma. The first step deposition uses high argon concentration and low sputter etch-to-deposition (E/D) ratio. High E/D ratio maintains the gap openings without necking. In the second step, a lower argon concentration and lower E/D ratio are used. Since observed metal defects are caused by argon diffusion in the top 200 – 300 nm of the HDP-CVD film, by controlling argon concentration in the top part of the film (i.e. second step deposition) to a low value, a reduced number of metal defects are achieved.

FIG. 4