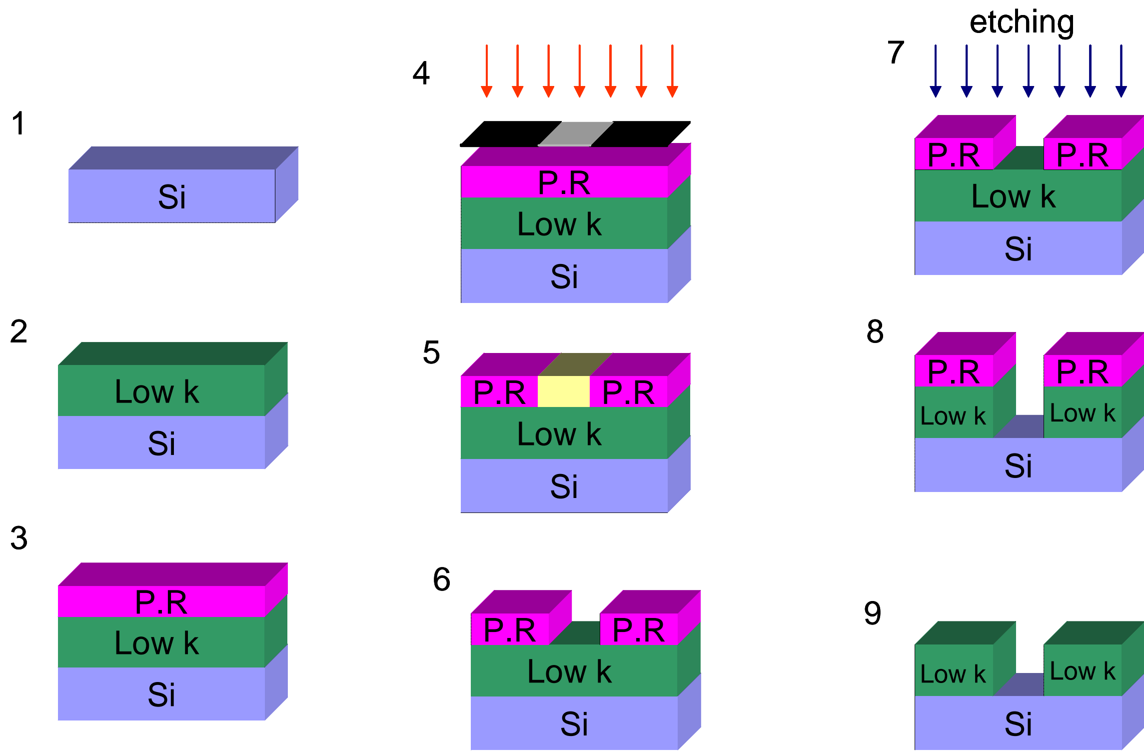

Figure 4-1 Traditional lithography process for the fabrication of damascene structure.

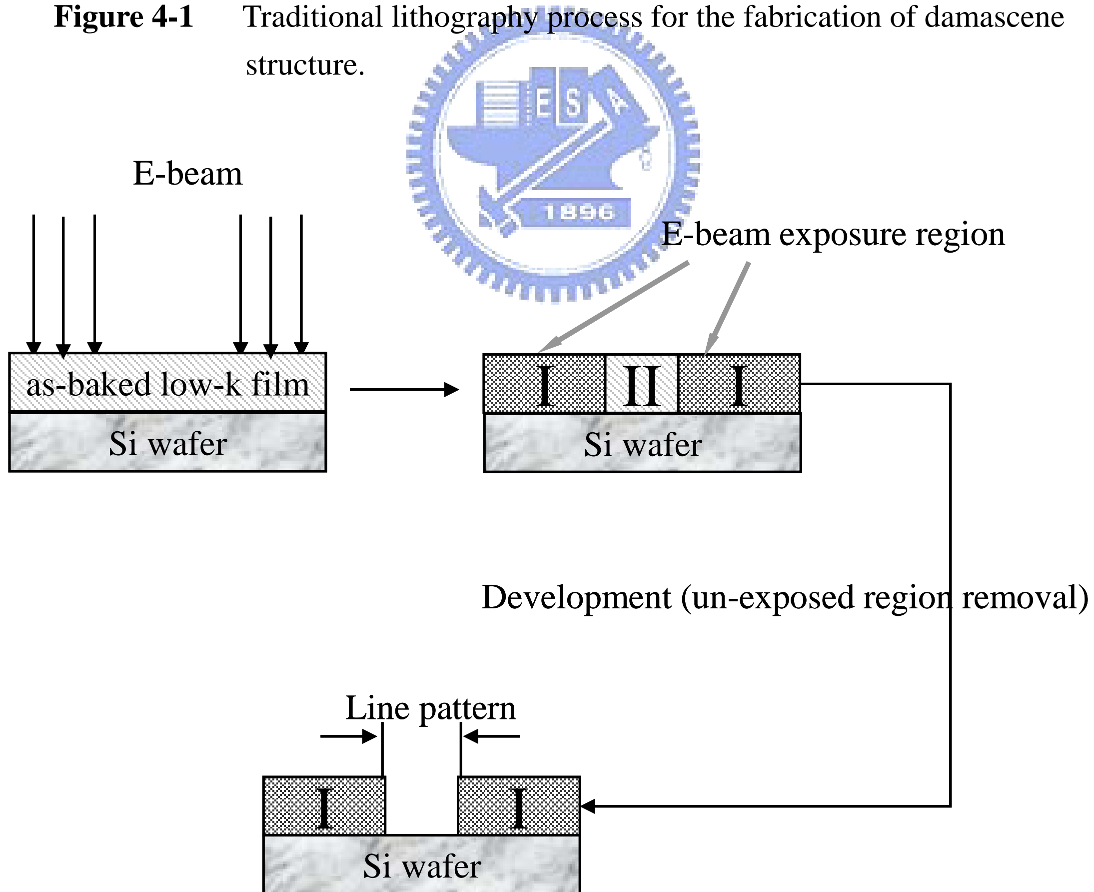

Figure 4-2 Proposed e-beam lithography process for the fabrication of damascene structure.

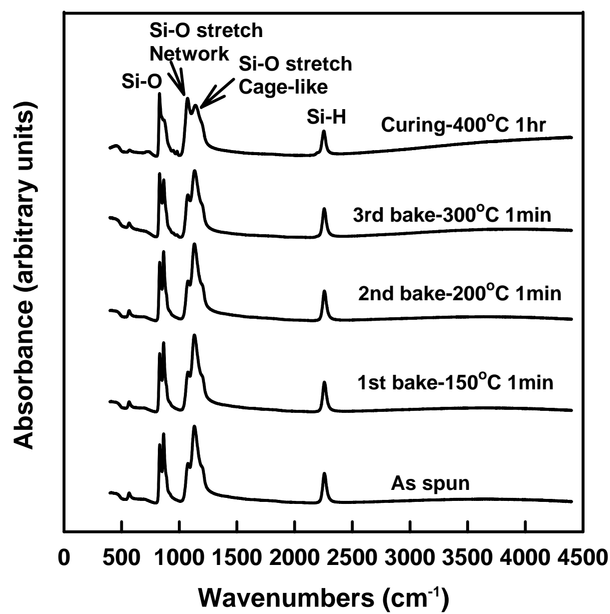

Figure 4-3 FTIR spectra of HSQ during traditional thermal baking and furnace curing processes.

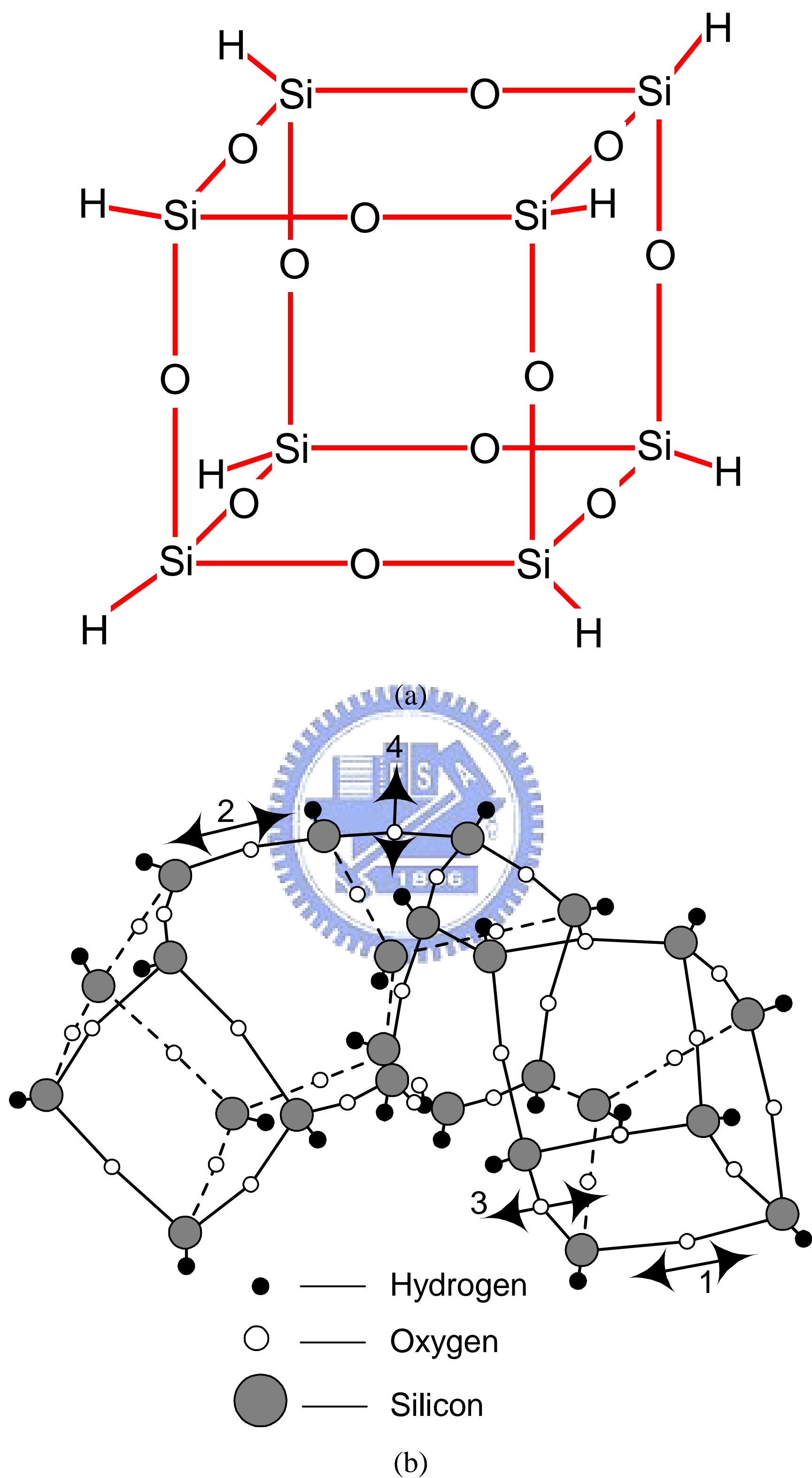

Figure 4-4 The (a) cage-like and (b) network-like structures of HSQ.

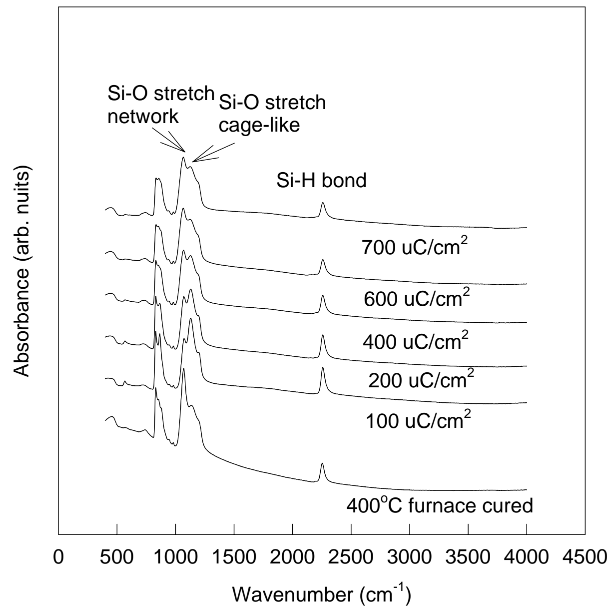

Figure 4-5 FTIR spectra of HSQ films with different doses of electron beam exposure, ranging from 100 uC/cm^2 to 700 uC/cm^2.

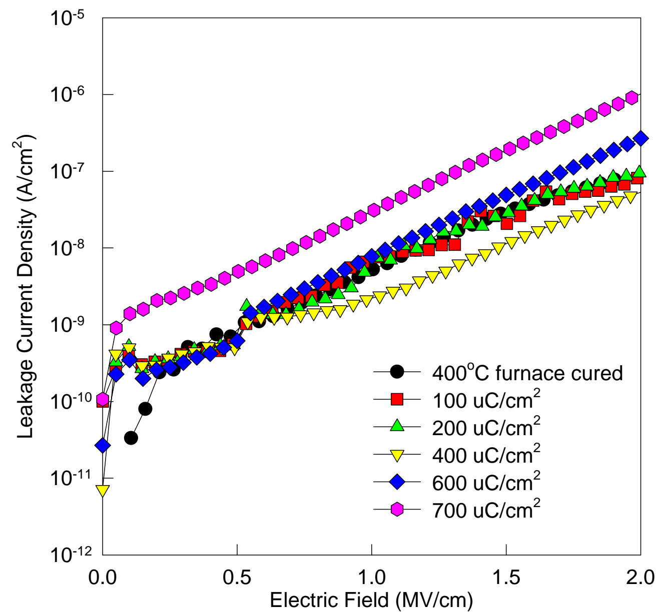

Figure 4-6 The leakage current densities of e-beam exposed HSQ films at different doses.

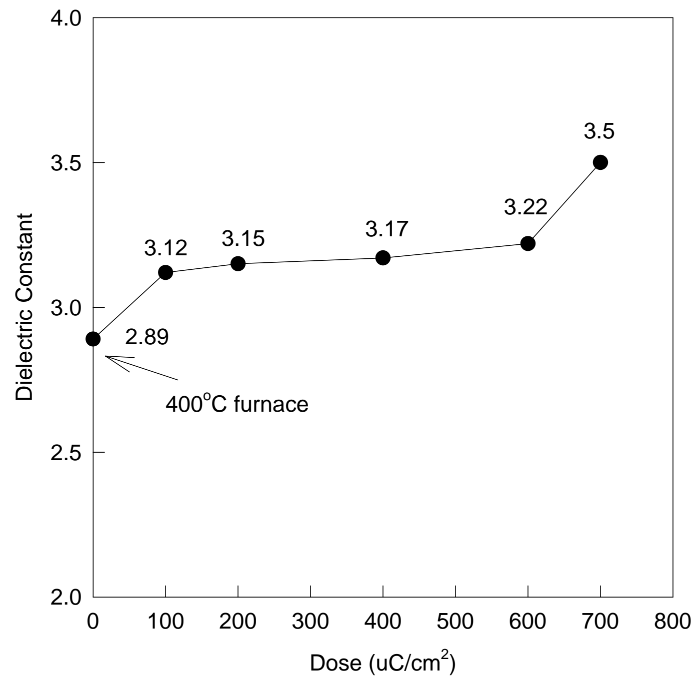

Figure 4-7 Dielectric constant of e-beam exposed HSQ films at different doses.

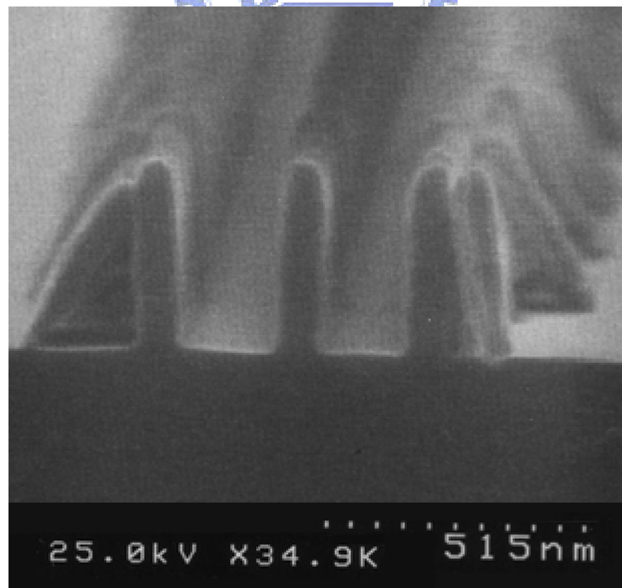

Figure 4-8 The SEM cross-sectioned profile of collapsed pattern for dense HSQ lines.

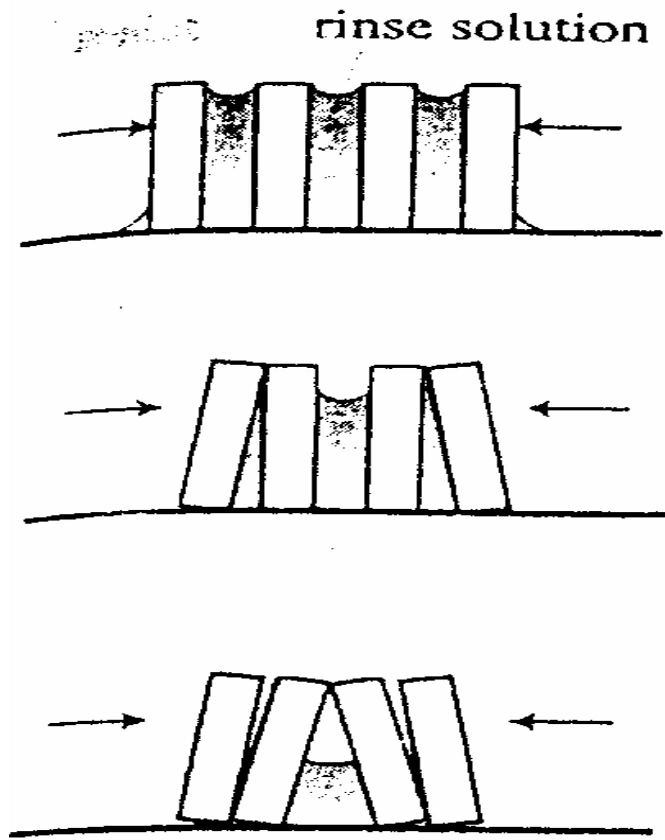

Figure 4-9 The possible scenario of pattern collapse for dense HSQ lines.

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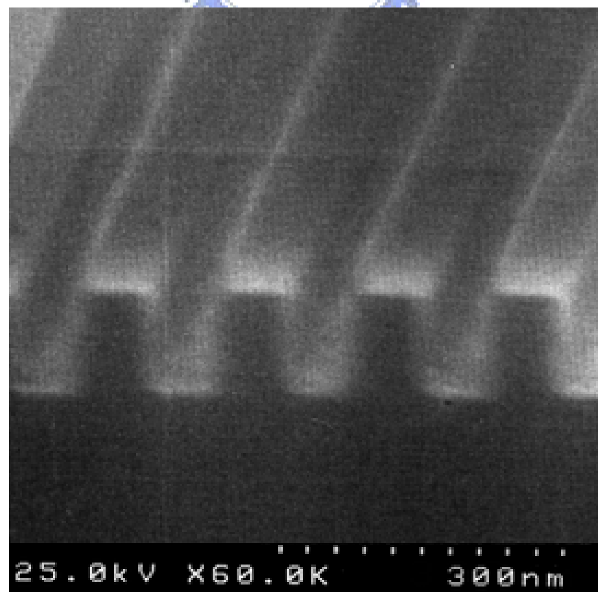

Figure 4-10 The SEM micrograph of patterned HSQ film with critical dimensions of 60 nm.

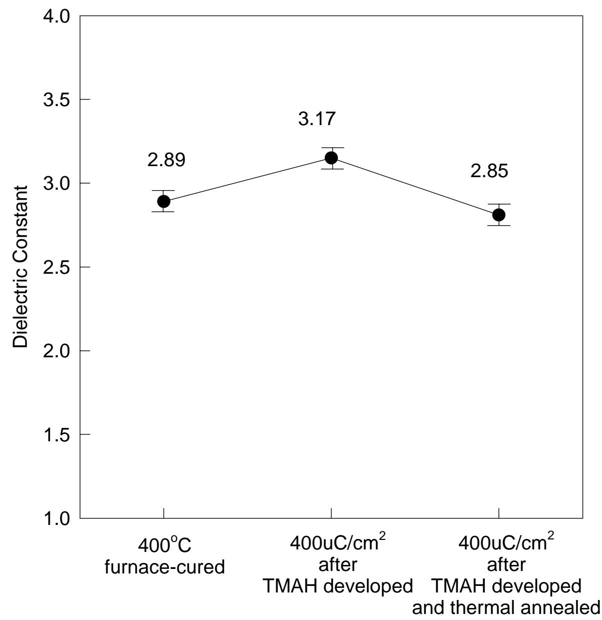

Figure 4-11 The comparison of dielectric constants of e-beam exposed HSQ films with different treatment.

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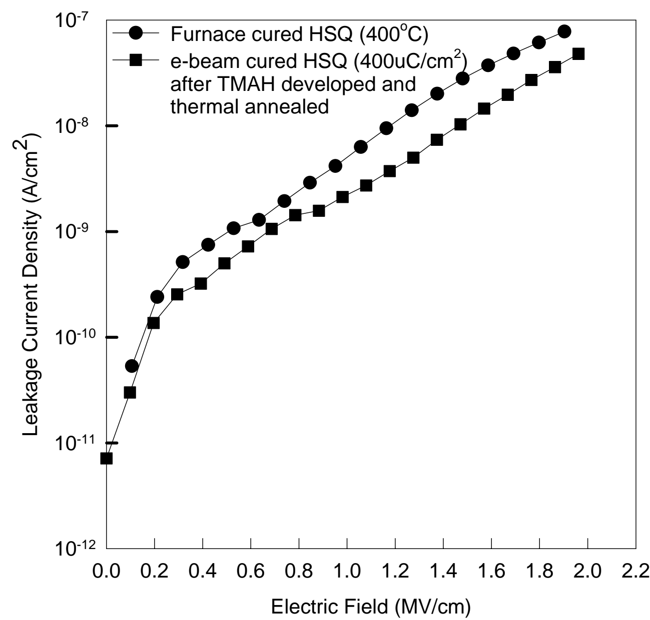

Figure 4-12 Leakage current of e-beam exposed HSQ with TMAH development followed by thermal annealing, as compared to typical furnace cured HSQ films.

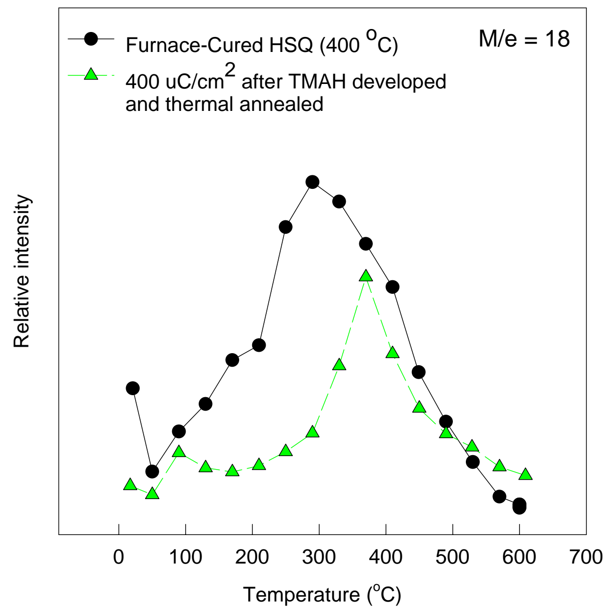

Figure 4-13 Temperature dependence of moisture desorption from HSQ films with e-beam exposed HSQ followed by TMAH developed and thermal annealed processes and with furnace curing.