METHOD TO CREATE AIR GAPS

ABSTRACT OF THE DISCLOSURE

Tin oxide films are used to create air gaps during semiconductor substrate processing. Tin oxide films, disposed between exposed layers of other materials, such as SiO_2 and SiN can be selectively etched using a plasma formed in an H_2-containing process gas. The etching creates a recessed feature in place of the tin oxide between the surrounding materials. A third material, such as SiO_2 is deposited over the resulting recessed feature without fully filling the recessed feature, forming an air gap. A method for selectively etching tin oxide in a presence of SiO_2, SiC, SiN, SiOC, SiNO, SiCNO, or SiCN, includes, in some embodiments, contacting the substrate with a plasma formed in a process gas comprising at least about 50% H_2. Etching of tin oxide can be performed without using an external bias at the substrate and is preferably performed at a temperature of less than about 100 °C.

Fig. 2