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AN IMPROVED METHOD FOR DEPOSITING AND PLANARIZING FLUORINATED BPSG FILMS

ABSTRACT OF THE DISCLOSURE

A method for improving the reflow characteristics of a BPSG film. According to the method, a fluorine- or other halogen-doped BPSG layer is deposited over a substrate and reflowed using a rapid thermal pulse (RTP) method. The use of such an RTP reflow method results in superior reflow characteristics as compared to a 20-40 minute conventional furnace reflow process. The inventors discovered that reflowing FBPSG films in a conventional furnace may result in the highly mobile fluorine atoms diffusing from the film prior to completion of the anneal. Thus, the FBPSG layer loses the improved reflow characteristics provided by the incorporation of fluorine into the film. The RTP reflow reflows the film in a minimal amount of time (e.g., 10-90 seconds depending on the temperature used to reflow the layer and the degree of planarization required among other factors). Thus, the fluorine atoms within the FBPSG layer do not have sufficient time to migrate from the layer even if the layer is deposited over a PETEOS oxide or similar layer.

Fig. 3