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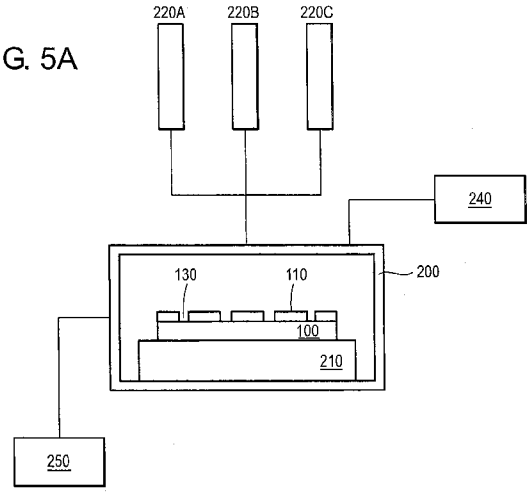
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(54) **Title:** VAPOR PHASE REPAIR AND PORE SEALING OF LOW-K DIELECTRIC MATERIALS

FIG. 5A



(57) **Abstract:** A method of treating a nanoporous low-k dielectric material formed on a semiconductor substrate is provided. The low-k dielectric material has etched openings with an etch damaged region containing silanol groups on exterior surfaces of the etched openings and on interior surfaces of interconnected pores. First, the low-k dielectric material is contacted with a vapor phase catalyst in an amount effective to form hydrogen bonds between the catalyst and the silanol groups in the etch damaged region, forming a catalytic intermediary. Second, the low-k dielectric material is contacted with a vapor phase alkoxysilane repair agent in an amount effective to react with about 50% or more of the silanol groups in the etch damaged region, such that the alkoxysilane repair agent reacts with the catalytic intermediary; and/or the low-k dielectric material is contacted with a vapor phase alkoxysilane sealing agent in an amount effective to prevent diffusion of an overlying barrier layer into the interconnected pores, such that the alkoxysilane sealing agent reacts with the catalytic intermediary.

WO 2009/085098 A1