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(54) Title: REPAIR AND RESTORATION OF DAMAGED DIELECTRIC MATERIALS AND FILMS

(57) Abstract: Methods of repairing voids in a material are described herein that include: a) providing a material having a plurality of reactive silanol groups; b) providing at least one reactive surface modification agent; and c) chemically capping at least some of the plurality of reactive silanol groups with the at least one of the reactive surface modification agents. Methods of carbon restoration in a material are also described that include: a) providing a carbon-deficient material having a plurality of reactive silanol groups; b) providing at least one reactive surface modification agent; and c)chemically capping at least some of the plurality of reactive silanol groups with the at least one of the reactive surface modification agents. In addition, methods are described herein for reducing the condensation of a film and/or a carbon-deficient film that include: a) providing a film having a plurality of reactive silanol groups; b) placing the film into a plasma chamber; c) introducing a plurality of reactive organic moieties-containing silanes into the chamber; and d) allowing the silanes to react with at least some of the reactive silanol groups. Dielectric materials and low-k dielectric materials are described herein that comprise: a) an inorganic material having a plurality of silicon atoms; and b) a plurality of organic moiety-containing silane compounds, wherein the silane compounds are coupled to the inorganic material through at least some of the silicon atoms.