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- (71) **Applicant:** **LAM RESEARCH CORPORATION**
[US/US]; 4650 Cushing Parkway, Fremont, California
94538-6470 (US).
- (72) **Inventors:** **ABEL, Joseph R.**; 2195 Brandon Place, West
Linn, Oregon 97068 (US). **AGNEW, Douglas Walter**;
6843 SW Tenth Avenue, Portland, Oregon 97219 (US).

LAVOIE, Adrien; 12705 NE Coyote Loop, Newberg, Ore-
gon 97132 (US). **CURTIN, Ian John**; 1497 SW Pendleton
Street, Portland, Oregon 97239 (US). **KUMAR, Purushot-**
tam; 6616 NE Karlson Court, Hillsboro, Oregon 97124
(US).

(74) **Agent:** **SCHEER, Bradley W.** et al.; Schwegman, Lund-
berg & Woessner, P.A., P. O. Box 2938, Minneapolis, Min-
nesota 55402 (US).

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(54) **Title:** LOW-K ALD GAP-FILL METHODS AND MATERIAL

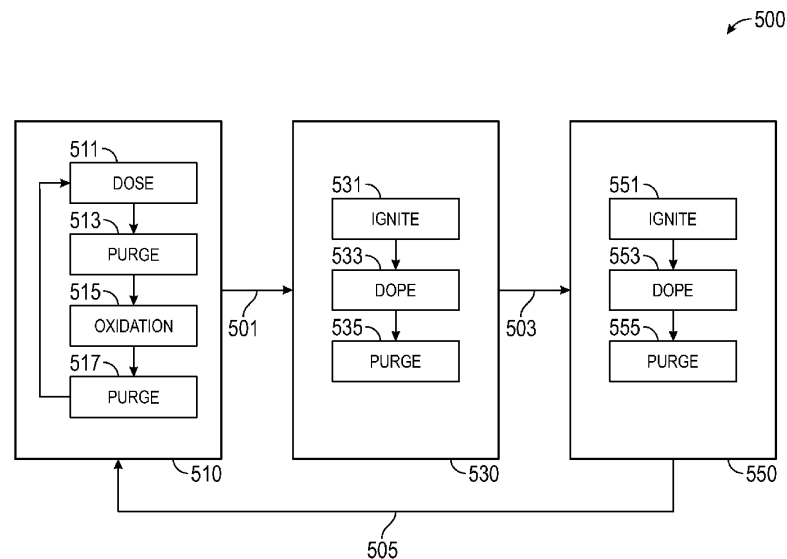


FIG. 5

(57) **Abstract:** Various embodiments include methods to produce low dielectric-constant (low-k) films. In one embodiment, alternating ALD cycles and dopant materials are used to generate a new family of silicon low-k materials. Specifically, these materials were developed to fill high-aspect-ratio structures with re-entrant features. However, such films are also useful in blanket applications where conformal nanolaminates are applicable. Various embodiments also disclose SiOF as well as SiOCF, SiONF, GeOCF, and GeOF. Analogous films may include halide derivatives with iodine and bromine (e.g., replace "F" with "I" or "Br"). Other methods, chemistries, and techniques are disclosed.

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