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(54) Title: IN-SITU PECVD CAP LAYER

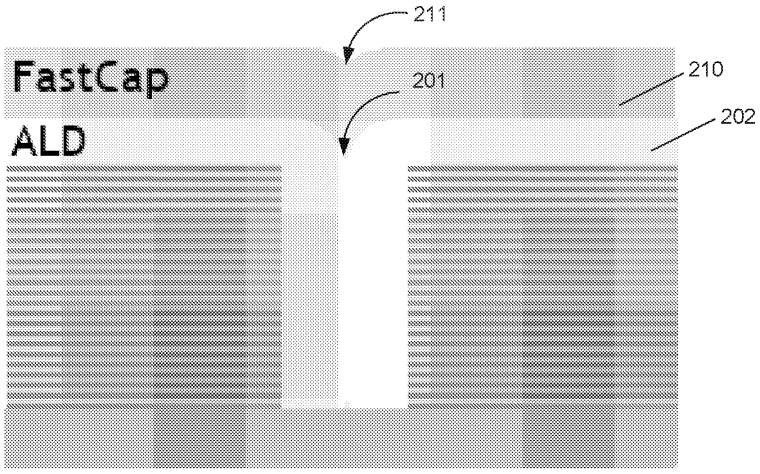

FIG. 3

(57) Abstract: Methods for filling gaps with dielectric material involve deposition using an atomic layer deposition (ALD) technique to fill a gap followed by deposition of a cap layer on the filled gap by a chemical vapor deposition (CVD) technique. The ALD deposition may be a plasma-enhanced ALD (PEALD) or thermal ALD (tALD) deposition. The CVD deposition may be plasma-enhanced CVD (PECVD) or thermal CVD (tCVD) deposition. In some embodiments, the CVD deposition is performed in the same chamber as the ALD deposition without intervening process operations. This in-situ deposition of the cap layer results in a high throughput process with high uniformity. After the process, the wafer is ready for chemical-mechanical planarization (CMP) in some embodiments.

[Continued on next page]

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