ABSTRACT OF THE DISCLOSURE

DEPOSITING TUNGSTEN INTO HIGH ASPECT RATIO FEATURES

Methods and apparatuses for filling high aspect ratio features with tungsten-containing materials are provided. The method involves providing a partially fabricated semiconductor substrate and depositing a tungsten-containing layer on the substrate surface to partially fill one or more high aspect ratio features. The method continues with selective removal of a portion of the deposited layer such that more material is removed near the feature opening than inside the feature. In certain embodiments, removal may be performed at mass-transport limited conditions with less etchant available inside the feature than near its opening. Etchant species are activated before being introduced into the processing chamber and/or while inside the chamber. In specific embodiments, recombination of the activated species is substantially limited and/or controlled during removal, e.g., operation is performed at less than about 250°C and/or less than about 5 Torr.

FIG. 3