

ABSTRACT

IMPROVED PLUG FILLING TECHNIQUE

A method and associated apparatus are described for filling high aspect ratio holes in a substrate with a material such as aluminum. Initially a seed layer of the hole filling material is laid down by means of 'long throw' sputtering, i.e. target and substrate are kept a substantial distance apart during sputtering. This causes most of the sputtered atoms to arrive at the substrate surface at normal angles of incidence thereby resulting in uniform coating of the holes' interiors without, at the same time, causing an excessive buildup of material on the other surfaces of the substrate. Once the seed layer is in place, the target-to-substrate distance is reduced to a value that is typical for conventional sputter-deposition. In addition, the temperature of the substrate is raised to at least 400 °C and sputtering is reinitiated. Under these conditions, effective filling of the holes can now occur.

FIGURE 1 IS SUGGESTED FOR PUBLICATION