LOW PRE-HEAT PRESSURE CVD IN PROCESS

ABSTRACT

A new method for preventing intermittent high Kelvin via resistance is achieved. This is accomplished by lowering the chamber pressure during warm-up, which prevents the wafer temperature from rising above about 380°C. The present invention uses a pressure of between 2 and 3 Torr during warm-up of the wafer prior to barrier metal deposition rather than 5 Torr, which is conventionally used. Using the conventional pressure of 5 Torr the wafer temperature overshoots to about 395°C before settling to about 380°C. By reducing the pressure to between 2 and 3 Torr, the thermal conductivity between the wafer heater and the wafer is reduced and the overshoot reduced or eliminated. The lower temperature reduces the deposition rate by approximately 10 angstroms over a 15 second deposition, but this is compensated for by an increase in deposition time. However, because the reaction is carried out in the reaction-limited regime, the step coverage will increase when wafer temperature is reduced. The deposition is followed by a N_2/H_2 plasma-annealing step.

Fig. 3