ABSTRACT

HIGH K ARTIFICIAL LATTICES FOR CAPACITOR APPLICATIONS TO USE IN CU OR AL BEOL

An improved and new process of fabricating high dielectric constant MIM capacitors. These high dielectric constant MIM capacitor met all of the stringent requirements needed for both for both RF and analog circuit applications. For the high dielectric constant MIM capacitor, the metal is comprised of copper electrodes in a dual damascene process. The dielectric constant versus the total thickness of super lattices is controlled by the number of layers either 4/4 , 2/2, and 1/1 artificial layers. Hence thickness of the film can be easily controlled. Enhancement of dielectric constant is because of interface. Dielectric constants near 900 can be easily achieved for *250* Angstrom thick super lattices. MBE, molecular beam epitaxy or ALCVD, atomic layer CVD techniques is used for this type layer growth process

31 FORMATION OF BOTTOM CAP. METAL ELECTRODE (M) USING DUAL DAMASCENE + CMP PROCESSES

32 DEPOSITION OF LOW K DIELECTRIC LAYER 1

33 DEPOSITION OF ETCH STOP LAYER (ESL)

34 DEPOSITION OF LOW K DIELECTRIC LAYER 2

35 DUAL DAMASCENE ETCHING FOR TRENCH/VIA FORMATION

36 DEPOSITION OF BARRIER METAL

37 DEPOSITION OF HIGH K SUPER LATTICE DIELECTRICS AND FORMATION OF CAPACITOR INSULATOR (I)

38 FORMATION OF TOP CAP. METAL ELECTRODE (M) USING DUAL DAMASCENE + CMP PROCESSES FOR METAL-INSULATOR-METAL (MIM) CAP.

FIG. 3