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METHOD AND APPARATUS OF FORMING A SPUTTERED DOPED SEED LAYER

ABSTRACT OF THE DISCLOSURE

The present invention generally provides a method and apparatus for forming a doped layer on a substrate to improve uniformity of subsequent deposition thereover.

5 Preferably, the layer is deposited by a sputtering process, such as physical vapor deposition (PVD) or Ionized Metal Plasma (IMP) PVD, using a doped target of conductive material. Preferably, the conductive material, such as copper, is alloyed with a dopant, such as phosphorus, boron, indium, tin, beryllium, or combinations thereof, to improve deposition uniformity of the doped layer over the substrate surface and to reduce oxidation
10 of the conductive material. It is believed that the addition of a dopant, such as phosphorus, stabilizes the conductive material surface, such as a copper surface, and lessens the surface diffusivity of the conductive material. The overall surface diffusivity of copper is reduced such that the tendency to agglomerate or to become discontinuous is reduced, thereby allowing the deposition of a smoother conductive film and thereby reducing localized
15 agglomeration of the conductive material. The smoother film is highly desirable for subsequent deposition processes. A conductive material, such as copper, can be deposited on the deposited doped layer by a variety of processes including PVD, chemical vapor deposition (CVD), electroplating, electroless deposition and other deposition processes.

Figure 2