ABSTRACT

CLEANING CONTACT WITH SUCCESSIVE FLUORINE AND HYDROGEN PLASMAS

A method of cleaning a contact area of a semiconductor or metal region on a substrate of an electronic device. First, the contact area is cleaned by exposing the substrate to a plasma that includes fluorine-containing species. Second, the substrate is exposed to a second atmosphere that scavenges fluorine, preferably formed by plasma decomposition of a hydrogen-containing gas. The second atmosphere removes any fluorine residue remaining on the contact area and overcomes any need to include argon sputtering in the cleaning process. Another aspect of the invention is a method of depositing a refractory metal over a contact area of a semiconductor region on a substrate. The contact area is cleaned according to the two-step process of the preceding paragraph. Then a refractory metal is deposited over the contact area. The two-step cleaning process can reduce the electrical resistance between the refractory metal and the semiconductor region. Furthermore, if the substrate is annealed to interdiffuse atoms of the semiconductor material and the refractory metal, the two-step cleaning process can reduce the anneal temperature required to achieve a desired low electrical resistance.

Fig. 1