

Abstract

SEMICONDUCTOR DEVICE AND METHOD OF FORMING IPD STRUCTURE USING SMOOTH CONDUCTIVE LAYER AND BOTTOM-SIDE CONDUCTIVE LAYER

A semiconductor device is made by forming a smooth conductive layer over a substrate. A first insulating layer is formed over a first surface of the smooth conductive layer. A first conductive layer is formed over the first insulating layer. A second insulating layer is formed over the first insulating layer and first conductive layer. The substrate is removed. A second conductive layer is formed over a second surface of the smooth conductive layer opposite the first surface of the smooth conductive layer. A third insulating layer is formed over the second conductive layer. The second conductive layer, smooth conductive layer, first insulating layer, and first conductive layer constitute a MIM capacitor. A portion of the second conductive layer includes an inductor. The smooth conductive layer has a smooth surface to reduce particles and hill-locks which decreases ESR, increases Q factor, and increases ESD of the MIM capacitor.

(Fig. 3g)