METHOD FOR MAKING FIELD EFFECT TRANSISTORS WITH IMPROVED IMPLANTS

ABSTRACT

A MOSFET (20) comprises a drain region (22), a source region (24) adjacent to a channel region (27), a gate oxide (28) situated on the channel region (27), a gate conductor (23) with vertical side walls (26) on the gate oxide (28), and a threshold adjust implant region (71) and/or punch through implant region (71) aligned with respect to, and limited to an area underneath, the gate conductor (23). The MOSFET (20) can be made by forming a dielectric stack on a semiconductor structure, defining an etch window having the lateral size and shape of a gate hole to be formed, defining the gate hole by transferring the etch window into the dielectric stack using a reactive ion etching (RIE) process, implanting threshold adjust dopants and/or punch through dopants through the gate hole, depositing a gate conductor to fill the gate hole, removing portions of the gate conductor covering the semiconductor structure surrounding the gate hole, and removing at least part of the dielectric stack.

Fig. 2