ABSTRACT

METHOD FOR FORMING A SHALLOW JUNCTION REGION USING DEFECT ENGINEERING AND LASER ANNEALING

A method for forming a shallow junction region in a crystalline semiconductor substrate and method for fabricating a semiconductor device having the shallow junction region includes a defect engineering step in which first ions are introduced into a first region of the substrate and vacancies are generated in the first region. During the generation of substrate vacancies, the first region remains substantially crystalline. Interstitial species are generated in a second region and second ions are introduced into the second region to capture the interstitial species. Laser annealing is used to activate dopant species in the first region and repair implantation damage in the second region. The defect engineering process creates a vacancy-rich surface region in which source and drain extension regions having high dopant activation and low sheet resistance are created in an MOS device.

Fig. 3