SILICON - GERMANIUM VIRTUAL SUBSTRATE AND METHOD OF FABRICATING THE SAME

ABSTRACT

A method of forming a relaxed silicon - germanium layer for accommodation of an overlying silicon layer formed with tensile strain, has been developed. The method features growth of multiple composite layers on a semiconductor substrate, with each composite layer comprised of an underlying silicon - germanium - carbon layer and of an overlying silicon - germanium layer, followed by the growth of an overlying thicker silicon - germanium layer. A hydrogen anneal procedure performed after growth of the multiple composite layers and of the thicker silicon - germanium layer, results in a top composite layer now comprised with an overlying relaxed silicon - germanium layer, exhibiting a low dislocation density. The presence of silicon - carbon micro crystals in each silicon - germanium - carbon layer reduces the formation of, and the propagation of threading dislocations in overlying silicon - germanium layers, therefore also reducing extension of these defects into an overlying silicon layer, wherein the tensile strained silicon layer will be used to accommodate a subsequent device structure.

FIG. 3