METHOD AND STRUCTURE USING SELECTED IMPLANT ANGLES USING A LINEAR ACCELERATOR PROCESS FOR MANUFACTURE OF FREE STANDING FILMS OF MATERIALS

ABSTRACT OF THE DISCLOSURE

A method for fabricating free standing thickness of materials using one or more semiconductor substrates, e.g., single crystal silicon, polysilicon, silicon germanium, germanium, group III/IV materials, and others. In a specific embodiment, the present method includes providing a semiconductor substrate having a surface region and a thickness. The method includes subjecting the surface region of the semiconductor substrate to a first plurality of high energy particles provided at a first implant angle generated using a linear accelerator to form a region of a plurality of gettering sites within a cleave region, the cleave region being provided beneath the surface region to defined a thickness of material to be detached, the semiconductor substrate being maintained at a first temperature. In a specific embodiment, the method includes subjecting the surface region of the semiconductor substrate to a second plurality of high energy particles at a second implant angle generated using the linear accelerator, the second plurality of high energy particles being provided to increase a stress level of the cleave region from a first stress level to a second stress level. In a preferred embodiment, the semiconductor substrate is maintained at a second temperature, which is higher than the first temperature. The method frees the thickness of detachable material using a cleaving process, e.g., controlled cleaving process.

Figure 7