PROCESS FOR FABRICATING A SEMICONDUCTOR DEVICE HAVING EMBEDDED EPITAXIAL REGIONS

ABSTRACT

A process for fabricating a semiconductor device, such as a strained-channel transistor, includes forming epitaxial regions in a substrate in proximity to a gate electrode in which the surface profile of the epitaxial regions is defined by masking sidewall spacers adjacent the gate electrode. The epitaxial regions are formed by depositing an epitaxial material into cavities selectively etched into the semiconductor substrate on either side of the gate electrode. The masking sidewall spacers limit the thickness of the epitaxial deposited material in proximity of the gate electrode, such that the upper surface of the epitaxial material is substantially the same as the principal surface of the semiconductor substrate. Doped regions are formed in the channel region beneath the gate electrode using an angled ion beam, such that doping profiles of the implanted regions are substantially unaffected by surface irregularities in the epitaxially-deposited material.

Figure 5