METHOD FOR FABRICATING A SEMICONDUCTOR DEVICE HAVING AN EPITAXIAL CHANNEL AND TRANSISTOR HAVING SAME

ABSTRACT OF THE DISCLOSURE

A transistor having an epitaxial channel and a method for fabricating a semiconductor device having an epitaxial channel, the method including forming a hardmask on a substrate and forming an opening in the hardmask. The opening is geometrically characterized by a long dimension and a short dimension, and the opening is arranged in a predetermined manner relative to the channel region of a transistor. An epitaxial material is formed in the opening that induces strain in substrate regions proximate to the epitaxial material. The epitaxial material is confined to the opening, such that an epitaxial channel is formed. A transistor is fabricated in proximity to the epitaxial channel, such that the strain induced in the substrate provides enhanced transistor performance. By confining the epitaxial material to a predefined channel in the substrate, plastic strain relaxation of the epitaxial material is minimized and a maximum amount of strain is induced in the substrate.

Figure 4