ABSTRACT

METHOD OF SELECTIVE POST-GROWTH TUNING OF AN OPTICAL BANDGAP OF A SEMI-CONDUCTOR HETEROSTRUCTURE AND PRODUCTS PRODUCED THEREOF

A method of controlling the degree of IFVEI for post-growth tuning of an optical bandgap of a semiconductor heterostructure. The resultant layer structure may contain a semi-conductor heterostructure with one or more regions with selectively modified bandgap. According to one aspect of the invention, a metal interlayer is deposited between the heterostructure and a dielectric layer such as silica. According to another aspect of the invention, an oxidized surface is provided between a dielectric layer and the heterostructure. The presence of the oxide layer improves stability and reproducibility in the post-annealing process. In a further aspect, the oxide layer may be provided between the interlayer and the heterostructure. In one embodiment of the invention, a photoresist mask with a specific pattern is deposited on the surface of the heterostructure so that the interlayer is deposited in an unmasked region whereon post-growth tuning results. In another embodiment, multiple photolithography is performed to deposit interlayers of varying thickness and/or regions on the heterostructure, followed by thermal post-annealing of the dielectric layer. This method produces heterostructures with optical bandgaps having selectively tuned regions.

FIGURE 1A