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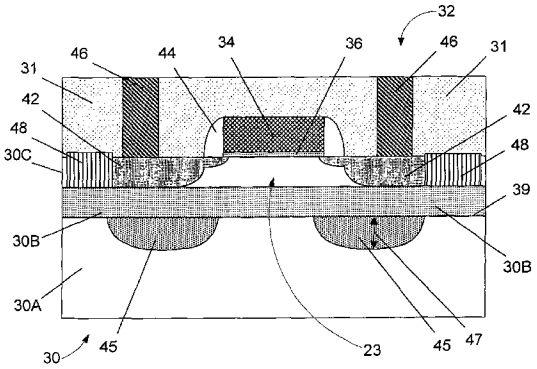
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(54) Title: METHOD OF MAKING AN SOI SEMICONDUCTOR DEVICE HAVING ENHANCED, SELF-ALIGNED DIELECTRIC REGIONS IN THE BULK SILICON SUBSTRATE



(57) Abstract: In one illustrative embodiment, the method comprises forming a gate electrode 34 above an SOI substrate 30 comprised of a bulk substrate, a buried insulation layer 30B and an active layer 30C, the gate electrode 34 having a protective layer 34A formed thereabove, and forming a plurality of dielectric regions 45 in the bulk substrate 30 after the gate electrode 34 is formed, the dielectric regions 45 being self-aligned with respect to the gate electrode 34, the dielectric regions 45 having a dielectric constant that is less than a dielectric constant of the bulk substrate 30A. In further embodiments, the method comprises forming a gate electrode 34 above an SOI substrate 30 comprised of bulk substrate 30A, a buried insulation layer 30B and an active layer 30C, the gate electrode 34 having the protective layer 34A formed thereabove, performing at least one oxygen implant process after the gate electrode 34 and the protective layer 34A are formed to introduce oxygen atoms into the bulk substrate 30A to thereby form a plurality of oxygen-doped regions 52 in the bulk substrate 30A, and performing at least one anneal process to convert the oxygen-doped regions 52 to dielectric regions 45 comprised of silicon dioxide in the bulk substrate 30A. In one illustrative embodiment, the device comprises a gate electrode 34 formed above an SOI structure 30 comprised of a bulk substrate 30A, a buried insulation layer 30B, and an active layer 30C, and a plurality of dielectric regions 45 comprised of silicon dioxide formed in the bulk substrate 30A, the dielectric regions 45 being self-aligned with respect to the gate electrode 34.

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