ABSTRACT

PULSED LASER SALICIDATION FOR FABRICATION OF ULTRA-THIN SILICIDES IN SUB-QUARTER MICRON DEVICES

Methods are disclosed for forming ultra-thin (~300 Å) thick, uniform and stoichiometric C54-titanium silicide with a Ti film thickness of 200-300 Å using pulsed laser salicidation. The invention achieves this by preferably step-scanning from die to die, across the wafer using laser pulses with an optical fluence (laser energy) ranging from 0.1 to 0.2 J/cm^2 for approximately 23 nanoseconds per pulse. The source of radiation can be a XeCl or KrF excimer laser, or one in which the laser's wavelength is chosen such that the laser energy is absorbed the most by the refractory metal, i.e. titanium (Ti), cobalt (Co) or nickel (Ni). The laser beam size is typically die-size or can be fine tuned to 1 to 100μm and can be optimized to reduce the intensity variation across the laser spot diameter. At each position between 1 to 100 pulses can be emitted on the wafer. Localized heating is possible with the ability to establish the ambient temperature at or below 100°C.

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(FIGURE 1 IS SUGGESTED FOR PUBLICATION)