TIME RESOLVED ANALYSIS OF fRTP™ THERMAL PULSE PROGRESSION IN SOI AND BULK SILICON WAFERS.

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The need to reduce both leakage and junction depth, and to maximize activation in devices has lead to the implementation of Flash-assist RTP™ (fRTP). The unique time-temperature profile produced by fRTP consists of first rapidly heating the bulk of the wafer to an intermediate temperature and then exposing the implanted surface of the wafer to an intense flash of radiation. Cooling of the implanted surface is then controlled by the conduction of heat into the wafer bulk. Future generations of planar CMOS devices may make extensive use of Silicon on Insulator (SOI) technology. Due to the nature of the formation of SOI, the progression of a short duration thermal input pulse, on the order of 1ms, could be altered by the presence of the buried oxide layers. With the introduction of SOI device wafers and the pending introduction of fRTP into the manufacturing environment, it has become necessary to investigate how a time resolved thermal front progresses through an SOI wafer. This paper investigates and describes the thermal physics involved in the progression of a short duration thermal input pulse through an SOI wafer. A comparative thermal model study using a typical bulk silicon production wafer is also presented here.