C — 6 — 2 (Invited) AUGER RECOMBINATION STUDY IN SILICON USING A TUNNELLING TECHNIQUES

R. M. Swanson

Stanford Electronics Laboratories

Stanford, CA 94305, U.S.A.

ABSTRACT

Auger recombination is often thought to be the dominant recombination mechanism in highly doped silicon. Auger coefficients in the neighborhood of 3×10^{-31} cm^6/sec for n-type silicon are required to explain experimental lifetime data. A new method of studying Auger recombination through the hot electrons generated is presented and discussed. This technique uses the large difference in tunnelling probability through a thin SiO_2 layer between thermal and hot electrons to actually detect the hot Auger electrons. These measurements establish an upper limit on the band-to-band Auger coefficient of 5×10^{-32} cm^{-6}/sec. This result will be shown to be consistent with lifetime studies in laser generated electron-hole plasmas. The implication of this work is that recombination in highly doped silicon is usually dominated by trap assisted, and hence technologically variable, processes.