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A New Photoluminescence Band in Hafnium-implanted Silicon

RAVINDER SACHDEEVA, ANDREI ISTRATOV, Dept. of Materials Science, UC Berkeley, P.N.K. DEENAPANRAY, Australian National University, EICKE WEBER, Dept. of Materials Science, UC Berkeley — A photoluminescence band in the energy range of 700 meV to 950 meV associated with hafnium implanted in silicon is reported for the first time. Activation of the Hf-optical centers requires a 1000 ° C anneal step. The intensity of the PL lines appear to depend on the cooling conditions. The spectrum consists of five peaks in the rapidly quench sample as opposed to twenty one in the slow cool sample. The peak with the highest intensity, occurred in the rapidly quench sample, is found at 943.8meV with two phonon replicas. Temperature and excitation power dependent PL are performed on this peak. It is also found that oxygen coimplantation enhances the PL intensity. A shift in the position of photoluminescence peaks observed on the samples implanted with two different isotopes of Hf confirms that Hf-related origin of the observed photoluminescence band.

Eicke Weber
UC Berkeley

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