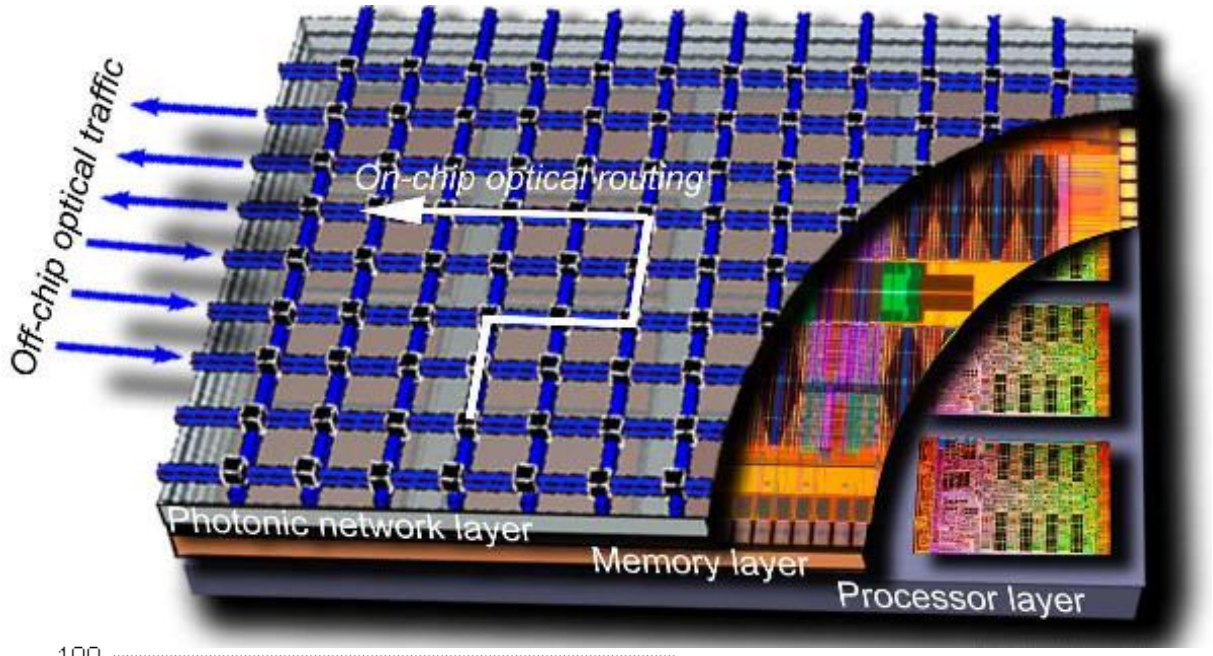
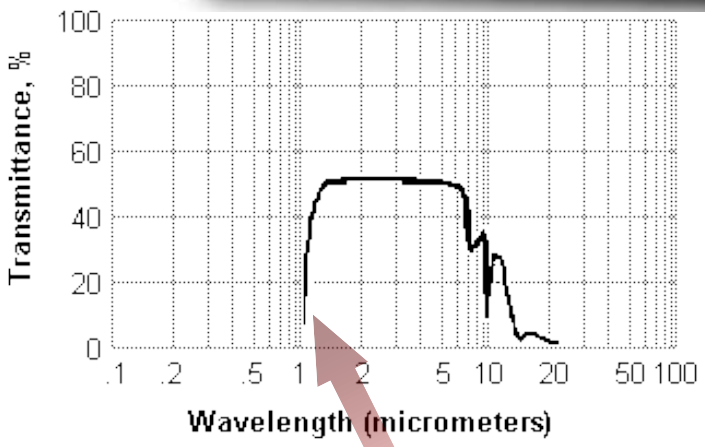
Research (What is it about?)	**Laser diode for silicon processors**
UNN authors	*Aleshkin V., Baidus N., Krasilnik Z., Nekorkin S., Rykov A.*
We find (The result)	*GaAs/AlGaAs* laser structures on a ***non-inclined*** *Si(001)* substrate are grown emitting in the ***transparency band*** of bulk silicon at room temperature
Abstract	Integrated optical circuits are the main way to increase the production of modern silicon processors. If one does that on the basis of existing well designed silicon technology, the emitting elements must work in the transparency band of bulk silicon ($\lambda > 1100$ nm) at room temperature. Now it is possible to reach this wavelength region in a laser structure with double *InGaAs/GaAsSb/GaAs* quantum wells but only on an inclined *Si(001)* substrate and at liquid-nitrogen temperature. The first makes it difficult to match them with CMOS technology, the second is practically unacceptable for processors. We have produced *GaAs/AlGaAs* laser structures with single *InGaAs* quantum wells with a higher indium content to increase the emission wavelength. The laser structures were grown by the metal-organic vapor-phase epitaxy (MOVPE) method on *Si(001)* substrates using a relaxed *Ge* buffer layer. To compare the radiation characteristics under optical pumping, the laser structures were grown on both an exactly oriented (***non-inclined***) *Si(001)* substrate and on a substrate inclined by 4° from the [001] axis to the [011] axis. It is shown that those structures can radiate in the ***transparency band*** of bulk silicon (1.09-1.11) nm at room temperature. The threshold power densities of optical excitation for stimulated emission, observed for the structures grown on exact and inclined substrates are 45 and 37 kW/cm^2, respectively.

Representative articles 2017-2018, quartiles	1. *Aleshkin V.Ya., Baidus N.V., Dubinov A.A., Krasilnik Z.F., Nekorkin S. M., Novikov A.V., Rykov A.V., Yurasov D.V., Yablonskiy A.N.* On the stimulated emission of InGaAs/GaAs/AlGaAs laser structures grown by MOCVD on exact and inclined Ge/Si(001) substrates. Semiconductors. **51**(5), 663-666 (2017).	Q4
	Q-index (Qi) for the result	**1**
	high green	

In collaboration	Institute for Physics of Microstructures RAS, Nizhny Novgorod 603950, Russia

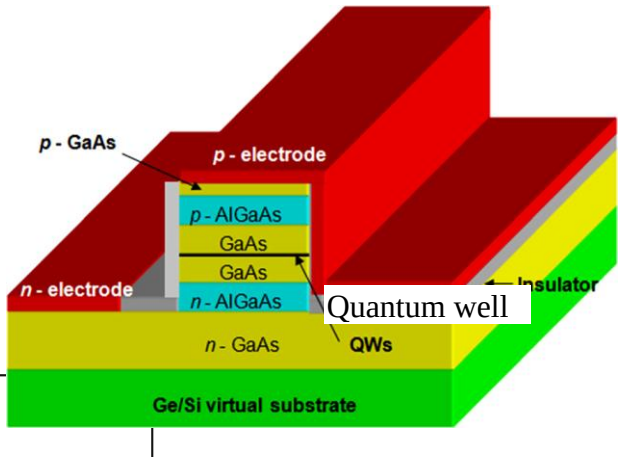


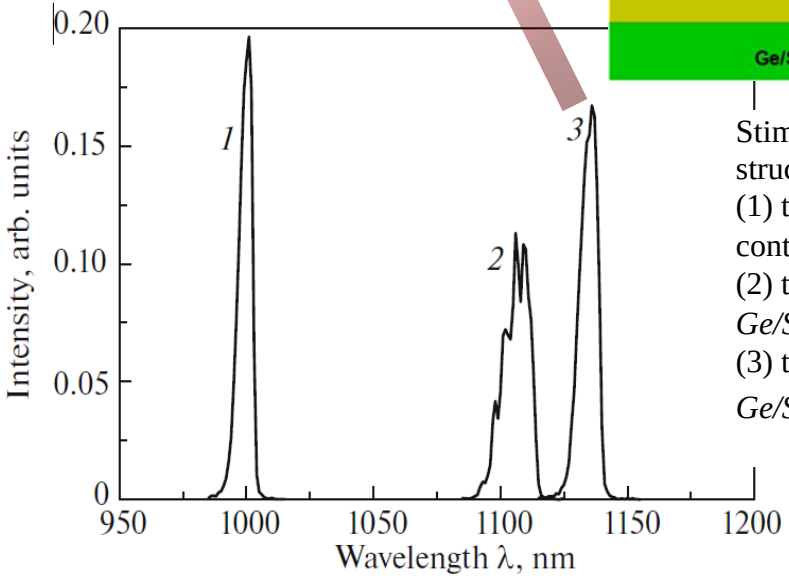
Integrated optical circuit on silicon (a project).



The transparency band of bulk silicon.

The schematic of a laser diode on a non-inclined *Ge/Si (001)* substrate





Stimulated emission spectra of laser structures:
(1) the existing structure with the *In* content x ≈0.17),
(2) the structure on the inclined *Ge/Si* substrate (x ≈0.33),
(3) the structure on the non-inclined *Ge/Si (001)* substrate (x ≈ 0.35).