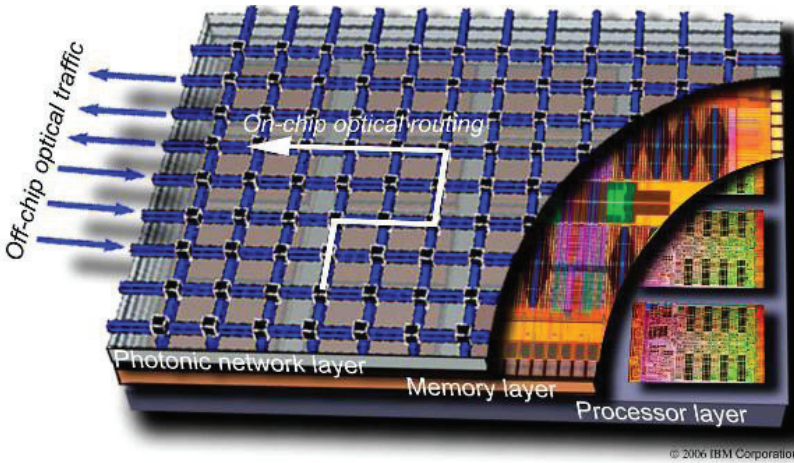


Research (What is it about?)	<b>Laser diode for silicon processors</b>
UNN authors	<i>Aleshkin V.Ya., Baidus N.V., Krasilnik Z.F., Nekorkin S. M., Rykov A.V.</i>
We find (The result)	GaAs/AlGaAs laser structures are grown emitting in the <b>transparency band</b> of bulk silicon
Abstract	<p>Integrated optical circuits is 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 (<math>\lambda &gt; 1100</math> 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 unacceptably for processors.</p> <p>We developed 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 (<b>non-inclined</b>) Si(001) substrate and on a substrate inclined by <math>4^\circ</math> from the [001] axis to the [011] axis. It is shown that those structures can radiate in the transparency region 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<sup>2</sup>, respectively.</p>

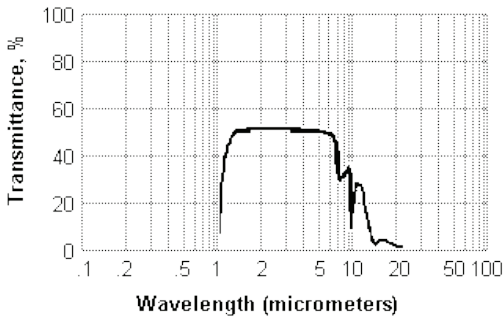
Representative articles 2016-2017, quartiles	1. Aleshkin V.Ya., Baidus N.V., Dubinov A.A., Krasilnik Z.F., Nekorkin S. M., Novikov A.V., Rykov A.V., Yurasov D.V., Yablonskiy A.N. On the stimulated emission of InGaAs/GaAs/AlGaAs laser structures grown by MOCVD on exact and inclined Ge/Si(001) substrates. Semiconductors. <b>51</b> (5), 663-666 (2017).	Q4
Q-index (Qi) of the result		<b>1</b>

In collaboration	Russian Acad Sci, Inst Phys Microstruct, Nizhnii Novgorod 603950, Russia
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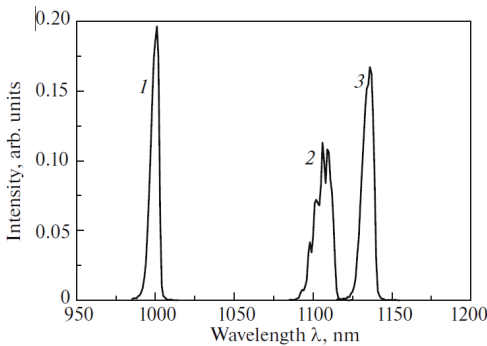


Integrated optical circuit on silicon

**Silicon**



The transparency band of bulk silicon



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