Research (What is it about?)	**Microdisk lasers on silicon**
UNN authors	*Baidus N., Dubinov A., Krasilnik Z., Novikov A., Pavlov D., Rykov A., Sushkov A.,Yurasov D.*
We find (The result)	Electrically-pumped ***microdisk laser*** monolithically deposited on a ***non-inclined*** *Si(001)* substrate at room temperature has been first created
Abstract	VCSEL (vertical-cavity surface-emitting lasers) or microdisk lasers are the modern generation of ***laser diodes*** (electrically-pumped lasers) with high operating characteristics. As is known, *n-p* junction is principally thin. Traditional laser diodes radiate along the junction, thus limiting their aperture, while microdisk lasers radiate in a transverse direction, and their aperture is limited only by the technological capability. By using microdisk lasers, it is possible to increase the transmission speed in data transmission systems up to 40 Gb/s in one channel. Supercomputers with petaflops production use only these lasers in data exchange channels. Planar complimentary metal-oxide semiconductor technology (***CMOS***) on silicon allows forming 2D matrices with a high number of individually addressed radiators. However, the problem is that CMOS technologies developed for strictly oriented along (001) crystallographic axis (***non-inclined***) silicon substrates while laser diodes work on *Si* substrates which noticeably diverge from (001) axis for reducing defects on the boundaries of different materials. We show that the use of ***buffer Ge layer*** can significantly suppress the defect emergence even on a non-inclined *Si(001)* substrate and ensure good crystalline quality and smooth surface, thus providing the subsequent growth of the high-quality microdisk heterostructure. On the basis of this *InGaAs/GaAs* structure with quantum well we create ***microdisk lasers*** with apertures 23, 27 and 31 μm which has the threshold current density 28 kA/cm^2 at ***room temperature***. It radiates in 850-1000 nm waveband in 0.5 μs pulses with the duty cycle 150 Hz.

Representative articles 2017-2018, quartiles	1. *Kryzhanovskaya N.V., Moiseev E.I., Polubavkina Y.S., Maximov M.V., Kulagina M.M., Troshkov S. I., Zadiranov Y,M., Lipovskii A.A., Baidus N.V., Dubinov A.A., Krasilnik Z.F., Novikov A.V., Pavlov D.A., Rykov A.V., Sushkov A.A.,Yurasov D.V.* Electrically pumped InGaAs/GaAs quantum well microdisk lasers directly grown on Si(100) with Ge/GaAs buffer. Optics Express. **25**(14), 16754-16760 (2017).	Q1
	Q-index (Qi) for the result	**4**
	high blue	

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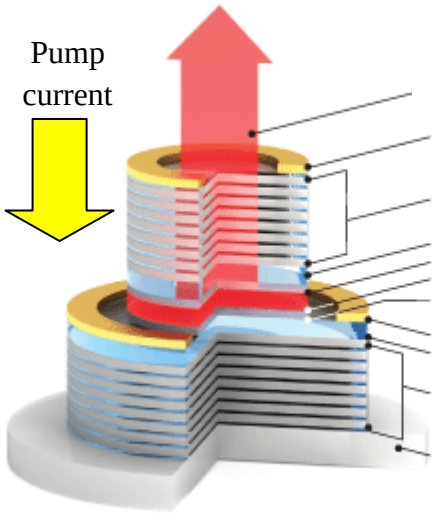
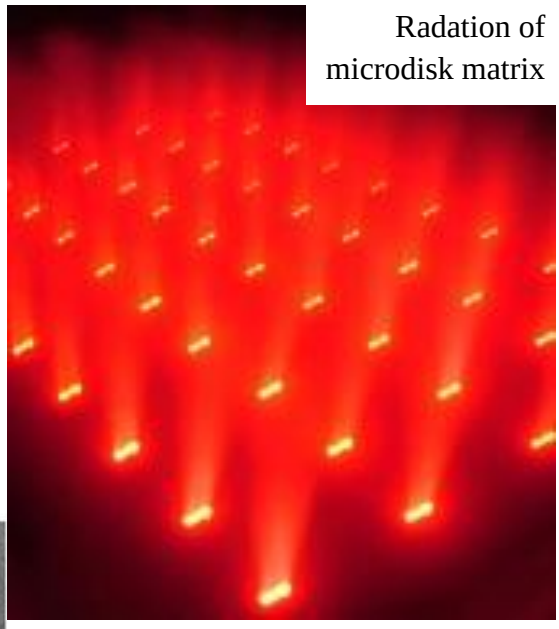
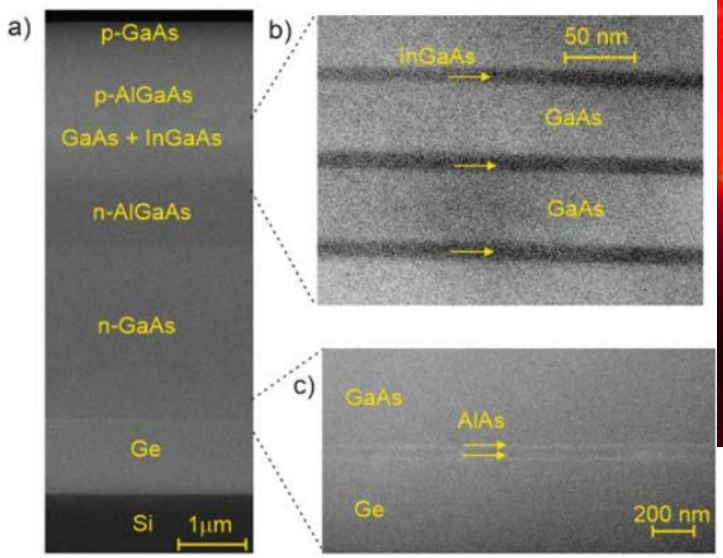


The schematic of a ***microdisk laser***: pump current and radiation are parallel.

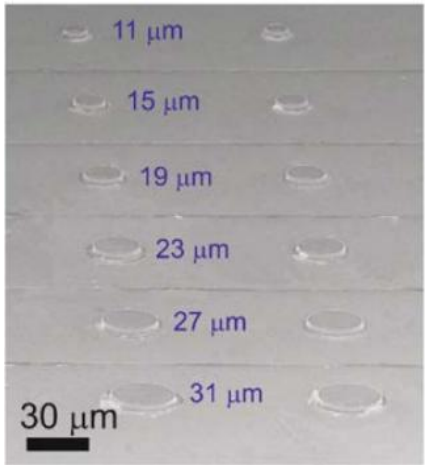
Radation of microdisk matrix

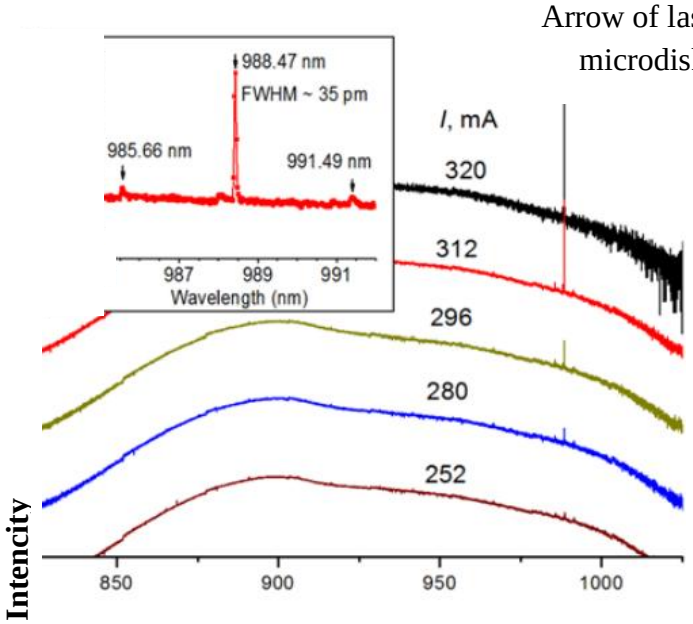




The transversal structure of microdisk on a non-inclined *Si(001)* substrate.

Arrow of laser microdisks.





Spectrum of 31 μm laser microdisk at various values of pump current. Inset: thin spectrum structure near threshold current (312 mA).