Research (What is it about?)	**Ultra longwave infrared semiconductor laser**
UNN authors	*Morozov S., Rumyantsev V., Kudryavtsev K., Antonov A., Dubinov A., Gavrilenko V.*
We find (The result)	Laser generation has been produced in ultra long infrared waveband from ***HgTe/HgCdTe*** heterostructures at near infrared pumping
Abstract	It would be favorable to employ compact semiconductor lasers as the sources of long infrared (IR) wavelength (***above 10 μm***) radiation. Quantum cascade lasers operate at 20 μm and at several specific wavelengths in 20÷25 μm range but their figures of merit are yet to be improved. The spectral range 25 ÷60 μm is now partly covered only with the lead salt diode lasers. However, their output power and operation temperature are limited by the growth technology. *HgTe/HgCdTe* heterostructures are the promising routes towards the 20÷50 μm wavelength range, where they may be quite competitive. We first produced laser generation at long infrared wavelengths ***up to 19.5 μm*** from *HgTe/HgCdTe* heterostructures (at temperature range 100÷20 K). *HgTe/HgCdTe* quantum well heterostructures with wide-gap *HgCdTe* dielectric waveguide was grown by molecular beam epitaxy technology on *GaAs* substrates. The pumping radiation with a continuously adjusted wavelength in near infrared (2÷2.3 μm) range was used. The threshold pumping intensity for maximum produced wavelength (19.5 μm) was 5 kW/cm^2 at 20 K while at maximum operating temperature (45 K) this maximum produced wavelength was reduced to 17.5 μm. One would expect the laser generation intensity to grow proportionally once the onset of pumping has taken place. Instead, after the onset, the generation reaches its climax and then drops and disappears as pumping intensity is increased. The “critical” pumping intensity, at which the generation is suppressed, is 50–150kW/cm^2.

Representative articles 2017-2018, quartiles	1. *Morozov S. V., Rumyantsev V. V., Fadeev M. A., Zholudev M. S., Kudryavtsev K. E., Antonov A. V., Kadykov A. M., Dubinov A. A., Mikhailov N. N., Dvoretsky S. A., Gavrilenko V. I.* Stimulated emission from HgCdTe quantum well heterostructures at wavelengths up to 19.5 μm. Appl. Phys. Lett. **111**, 192101 (2017).	Q1
	Q-index (Qi) for the result	**4**

high blue

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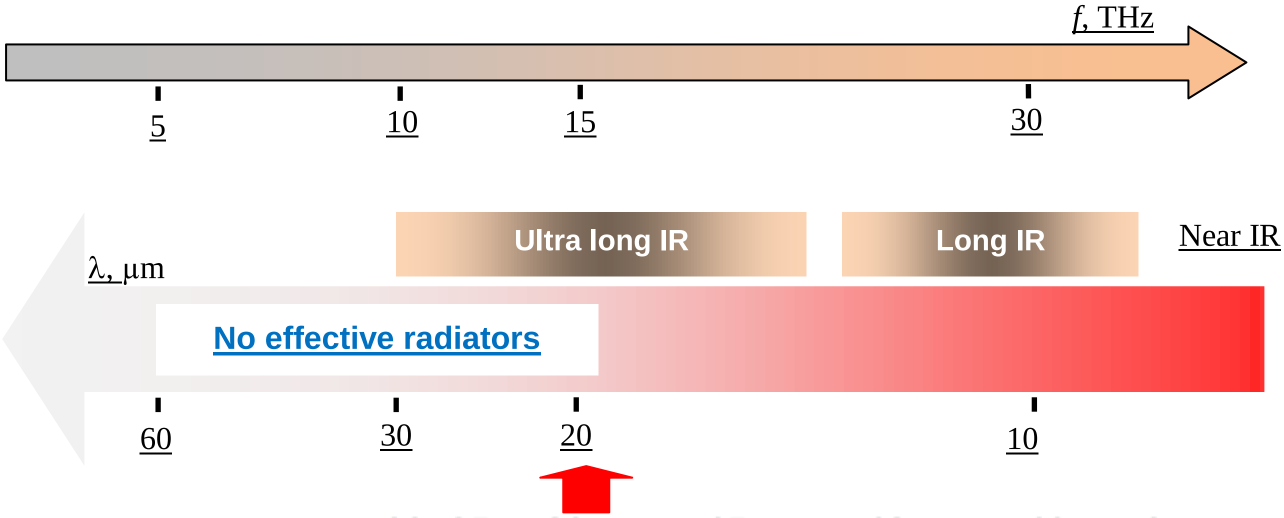
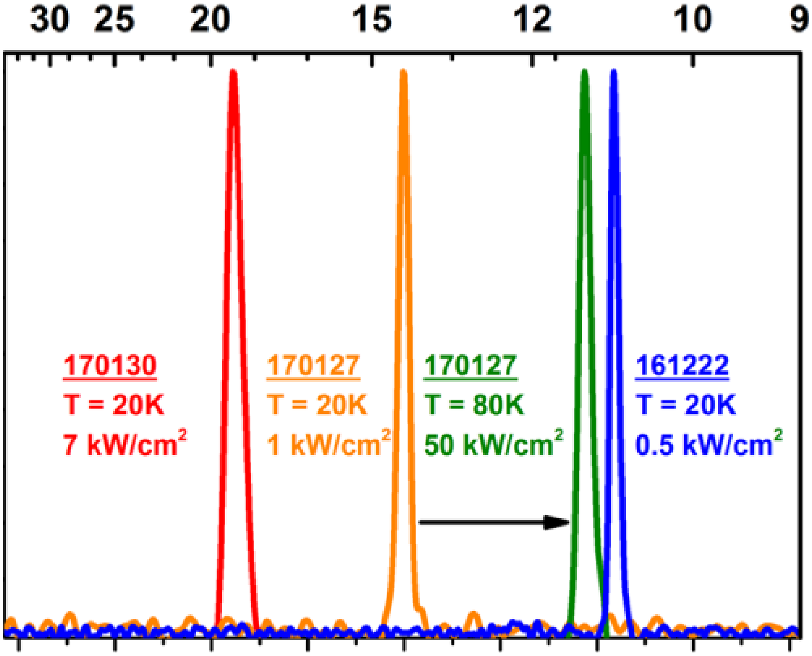
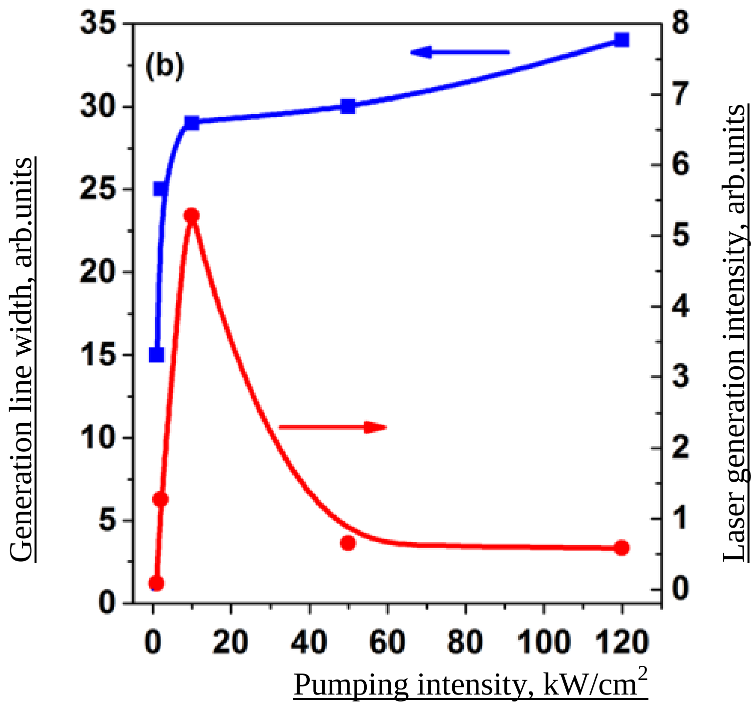




The laser spectra for several samples under study. The wavelengths are in microns.



Generation line width (blue) and its intensity (red) vs. pumping intensity at T=20 K.