Physicists develop laser with bandwith spanning 2 telecom windows

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A team of physicists in the Institute for Ultrafast Spectroscopy and Lasers (IUSL) of the Physics Department at The City College of New York (CCNY) have developed new near-infrared broadband laser materials with tunability ranges around triple those of earlier crystals. The new crystals have a tunability range of as much as 460 nanometers (nm) and have potential application in such fields as telecommunications, biomedical imaging and remote sensing.

“For the first time tunable laser operation was achieved at both the 1.33 um (microns) and 1.55 um telecommunication windows from a single optical center in trivalent chromium (Cr^{3+}) doped $LiInSiO_4$ (lithium iridium silicate) (Cr^{3+}:LISO) and $LiInGeO_4$ (lithium iridium germanate) (Cr^{3+}:LIGO) single crystals,” said Dr. Robert R. Alfano, Distinguished Professor of Science and Engineering and Director of IUSL.

The crystals have the widest bandwidth and the most near-infrared shifted wavelength range for laser operation ever demonstrated for the Cr^{3+} ion, noted Professor Alfano, who earlier this month was awarded The Optical Society of America’s Charles Hard Townes Award for his discovery of and work on the supercontinuum.

The Cr^{3+}:LISO crystal was tunable in the 1,160 nm to 1,620 nm range; the Cr^{3+}:LIGO crystal was tunable in the 1,150 to 1,600 nm range. Fosterite and Cunyite, earlier crystals developed at CCNY, have bandwidths of 165 nm (1,173 nm to 1,338 nm) and 144 nm (1,348 nm to 1,482 nm), respectively.

Because of their strong optical absorption in the range of laser diode pump sources and quantum efficiency of 50 percent, the new materials have promise for use in miniature broadband laser devices for telecommunication industry, biomedical imaging, optical coherence tomography, laser spectroscopy, ultrafast pulse generation and remote sensing, he added.

Source: City College of New York