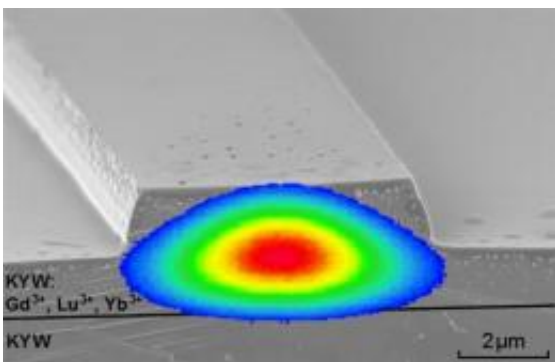


Dutch team provides alternative to optical semiconductor amplifiers

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Electron microscope image of a waveguide structure, superimposed with a measured intensity profile of the light trapped within it.

Researchers at the University of Twente's MESA+ research institute have developed a material capable of optical amplifications that are comparable to those achieved by the best, currently available semiconductor optical amplifiers. The researchers expect that this material will accelerate data communication and, ultimately, provide an alternative to short distance data communication (at the μm -cm scale).

On 16 November, University of Twente researcher Dimitri Geskus defended his PhD thesis based on this research.

The increasingly exacting requirements being imposed on data communication are boosting demand for high-speed optical amplifiers.

Current optical amplifiers suffer from the drawback that their speed is limited.

Researchers at the university have now developed a material capable of optical amplifications which match those achieved using the best, currently available semiconductor optical amplifiers, but at potentially higher data communication rates.

This material consists of thin crystalline layers whose optical properties were specially designed for the optical circuits found on chips. The researchers can fine-tune the properties of these thin crystalline layers by changing their composition.

Using a clever trick, they were able to embed much higher concentrations of optically active Ytterbium ions (Ytterbium is a rare-earth element) in the crystal.

In this way, they have boosted the optical amplification of currently available rare-earth-doped [materials](#) by more than one hundredfold. This will ultimately pave the way for faster and cheaper optical [data communication](#).

Details of this work, drawn from Mr Geskus' dissertation, were recently published in the leading scientific journal *Advanced Materials*.

Provided by University of Twente

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