

## Dissertation press release

04.11.2019

### Data-transmitting light signal gets power boost from nanosized amplifier

<b>Title of the dissertation</b>	Atomic layer deposition of erbium-doped thin films for silicon integrated waveguide amplifiers Atomikerroskasvatettujen ohutkalvojen soveltaminen pii-pohjaisiin valokanavavahvistimiin
<b>Contents of the dissertation</b>	<p>Light is a more energy efficient and faster way of transferring data than electricity. Until now, the rapid attenuation of light signals in microchips has prevented the use of light as a source of an information signal. With international collaboration, this thesis has developed a nanosized amplifier to help light signals propagate through microchips. The thesis shows that the signal attenuation can be significantly reduced when data is transferred inside a microchip, for example, from one processor to another.</p> <p>The breakthrough was made with the help of a Finnish invention: the atomic layer deposition method. According to thesis, the method is ideal for processing various kinds of microcircuits, as it plays an important role in manufacturing today's microprocessors. So far, the atomic layer deposition method has been used mainly in electronic applications. However, the study conducted in the thesis indicates that possible applications also exist in photonics.</p> <p>In the development of photonics, new components must also ideally work with electricity--that is, in electronics. Silicon is a key material in electronics, and that's why it's also included in the light amplifiers together with the amplification element erbium. There are no compatibility issues between silicon and erbium, which is extremely beneficial when it comes to mass production.</p>
<b>Field of the dissertation</b>	Optoelectronics and Photonics
<b>Doctoral candidate</b>	John-Olof Rönn, M. Sc. Born in Vantaa 1989
<b>Time of the defence</b>	29.11.2019, Time 12:00
<b>Place of the defence</b>	Aalto University School of Electrical Engineering, Micronova Large Seminar Hall, Tietotie 3, Espoo
<b>Opponent</b>	Professor Franz X. Kärtner, University of Hamburg, Germany
<b>Custos</b>	Professor Zhipei Sun, Aalto University School of Electrical Engineering, Department of Electronics and Nanoengineering
<b>Electronic dissertation</b>	<a href="http://urn.fi/URN:ISBN">http://urn.fi/URN:ISBN</a> <i>(permanent link to dissertation, if dissertation is already available in electronic form)</i>
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