

Dissertation press release**23.09.2019**

Next-generation touch surfaces

Title of the dissertation	Enhancing Optoelectronic Performance of Randomly Oriented Single-Walled Carbon Nanotube Films
Contents of the dissertation	<p>The market introduction of foldable and bendable screens boosted the development of effective material solutions for enabling the next generation display products of almost any form, shape, and size.</p> <p>Single-walled carbon nanotube films are among the strongest candidates for the replacement of a key material of all sorts of thin but rigid panels we currently have around us. While the flexible and stretchable nanotube-based films can outperform the most commonly used metal oxide ones such as indium-doped tin oxide (ITO) films, they still have to reach their high transparency and conductivity values.</p> <p>This dissertation reveals novel modification approaches to make the nanotube films as conductive as possible while keeping their transparency at nearly the same level as their direct competitors. The first technique utilizes the synergetic effect of both nanotubes and graphene to uncover the potential of such a hybrid material. The second one is devoted to the optimization of a widely used modification technique with chemical elements, where their correct selection with the proposed optimization leads to unprecedented optical and electrical values. The final one presents an approach based on a tiny droplet deposition right on top of the nanotubes for a controllable and reproducible adjustment of their highly desirable optoelectronic performance even at meter-scale film dimensions. Along with the techniques, the optical properties were extensively studied using optical spectroscopies to understand the nanotube fundamental parameters.</p> <p>As a consequence, each of these cases leads to the creation of films that exhibit superior properties and state-of-the-art performance.</p>
Field of the dissertation	Engineering Physics
Doctoral candidate	Alexey P. Tsapenko, M.Sc.
Time of the defence	04.10.2019 at 10.30
Place of the defence	Aalto University School of Science, lecture hall AS3, Maarintie 8, Espoo
Opponent	Professor Alexander Okotrub, Novosibirsk State University, Russia
Custos	Professor Esko I. Kauppinen, Aalto University School of Science, Department of Applied Physics
Electronic dissertation	http://urn.fi/URN:ISBN:978-952-60-8738-2
Doctoral candidate's contact information	Alexey P. Tsapenko, Department of Applied Physics, +7 916 650-41-09, alexey.tsapenko@aalto.fi (alexey.tsapenko@skolkovotech.ru)
