Aalto University

Dissertation press release 23.09.2019

Carbon nanotubes in electro-optical applications – from synthesis to devices

Title of the dissertation	Advanced synthesis of single-walled carbon nanotube films by aerosol CVD method for electro-optical applications
Contents of the dissertation	Single-walled carbon nanotubes (SWCNTs) are a unique family of materials emerging towards high performance applications in electronics and optoelectronics. However, despite significant progress over the last 25 years, the problem of SWCNT production with tailored characteristics, the absence of the growth models and post-synthesis methods to improve specific SWCNT properties are still the main barriers towards a wide range of applications. The methods of the SWCNT synthesis, data processing and SWCNT treatment developed are still not fully optimized. In current work we introduced a reactor designed with the use of spark discharge generated metallic nanoparticles as a source of catalyst. Also, we performed a comparative study of older and modern reactor generations. In addition, application of artificial neural networks in the chemical synthesis process of SWCNTs for prediction of main material characteristics was demonstrated. Finally, laser post-treatment of films significantly improved optoelectrical properties of the material. All these factors combined allowed us to create a number of new devices with the state-of-the-art-performance.
Field of the dissertation	Engineering Physics
Doctoral candidate	Vsevolod Iakovlev, M.Sc. Born in Ukraine in 1991
Time of the defence	04.10.2019 at 13:00
Place of the defence	Aalto University School of Science, lecture hall AS3, Maarintie 8, Espoo
Opponent	Professor Krisztian Kordas, University of Oulu, Finland
Custos	Professor Esko I. Kauppinen, Aalto University School of Science, Department of Applied Physics
Doctoral candidate's contact information	Vsevolod Iakovlev, +79852387206, Vsevolod.Iakovlev@skolkovotech.ru