

第357回GMSI公開セミナー／第180回CIAiSセミナー／第102回WINGSセミナー

# FC-CVD synthesis FWCNTs for transparent conductor applications

## Professor Esko I. Kauppinen

Department of Applied Physics, Aalto University School of Science

**Date: Tuesday, 21<sup>st</sup> December 2021 15:00-16:30**

**Venue: Faculty of Engineering Bldg. 2, Room 232/  
Online (hybrid)**

**For online zoom account, contact: [office@gmsi.t.u-tokyo.ac.jp](mailto:office@gmsi.t.u-tokyo.ac.jp)**

### Abstract:

We report transparent conducting films (TCF) of large-diameter CNTs from methane-based FC-CVD overcoming the performance–yield tradeoff. Based on the Fe-C-S system, the double-wall CNTs (DWCNTs) with a mean diameter of 4.15 nm and a mean bundle length of 20 μm have been produced into TCFs via FC-CVD. After gold chloride solution doping, the TCFs have an excellent performance of 42 ohm/sq sheet resistance at 90% transmittance. Unexpectedly, these high-performance DWCNTs films have an ultra-high yield i.e. production rate, being two orders of magnitude higher than that of SWCNT based TCFs with similar performance. Especially, these high-yield DWCNTs films contain ‘small’ bundles with around 50% of CNTs being individual, which is completely different from other FC-CVD results for SWCNTs produced at much lower yield. Moreover, the large-diameter DWCNTs will flatten at the junctions, which may provide a larger contact area between the tubes and accordingly may reduce the contact resistance. In addition, we discuss our recent research efforts towards synthesizing semiconducting SWNTs from liquid precursors (ethanol, methanol, isopropanol) using FC-CVD.



**Professor Esko I. Kauppinen**  
Department of Applied Physics,  
Aalto University School of Science,  
Espoo, FINLAND

主催： 東京大学大学院工学系研究科専攻間横断型教育プログラム 機械システム・イノベーション (GMSI)  
最先端融合科学イノベーション教育研究コンソーシアム (CIAiS)  
未来社会協創 国際卓越大学院 (WINGS CFS)  
未来社会デザインフェローシップ (DFS)  
量子科学技術フェローシッププログラム (Q-STEP)

PKU-UTokyo SGU program  
本件連絡先： 東京大学大学院工学系研究科機械工学専攻 教授 丸山茂夫  
GMSI事務局 E-mail: [office@gmsi.t.u-tokyo.ac.jp](mailto:office@gmsi.t.u-tokyo.ac.jp) Phone: 03-5841-0696