



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」

実践型リーダー養成事業「イノベーションリーダー養成演習」

博士課程教育リーディングプログラム

「社会構想マネジメントを先導する グローバルリーダー養成プログラム」



東京大学  
THE UNIVERSITY OF TOKYO

東京大学大学院  
工学系研究科

第165回GMSI公開セミナー/第82回実践リーダーレクチャー/第49回GSDMプラットフォームセミナー

## Single walled carbon nanotubes to replace Indium in touch sensors

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The inflation of the price of rare metal due to the limited supply is threatening the world-wide high-tech. industries. Because China is the major supplier, “rare metal” problem becomes the very important issue in national scientific policy in EU, US, and Japan. One example of such rare metal is “indium” used as ITO transparent-conductive film in smart phones and displays. The leader of EU-JST project IRENA (Indium replacement by single-walled carbon nanotube thin films), Professor Esko Kauppinen, will discuss the current progress of the technology.

Indium is currently used in wide variety of consumer electronics devices, such as in displays as well as in touch screens of mobile phones and ipad-style portable computers. In order to replace indium, which is the typical rare metal heavily used for transparent conductive films (TCF), we are developing single-walled carbon nanotubes (SWCNT). We report recent studies on the synthesis of high quality single walled carbon nanotubes with a ferro-cene-based floating catalyst CVD reactor and show that SWCNT networks consisting of long, clean and highly individualized SWNTs exhibit substantially improved TCF performance. In addition, we used our novel FC-CVD reactor based on spark discharge catalyst generation to experimentally study the effect of bundling on the performance of TCF and thin film transistors (TFT). The synthesis of SWCNTs relies on generation of iron catalyst particles in the diameter range of  $4 \pm 3$  nm with precisely tunable concentration into nitrogen carrier gas with a spark generator, allowing to grow individual and high-quality SWCNTs from CO with well-defined diameter and length distributions. Network thin film field effect transistors (TFT-FET) of individual SWCNTs exhibit higher uniformity in terms of both mobility and ON/OFF ratio compared to larger bundles.

主催:

東京大学大学院工学系研究科「機械システム・イノベーション」プログラム (GMSI)

東京大学実践型リーダー養成事業「イノベーションリーダー養成演習」(PCIL)

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