

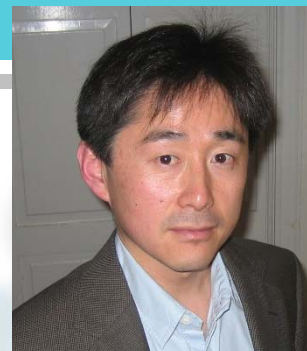


第139回 公開セミナー/第34回実践リーダーレクチャー

# Optoelectronic Properties of Macroscopic Ensembles of Carbon Nanotubes

## Professor Junichiro Kono

Department of Electrical & Computer Engineering  
and Department of Physics & Astronomy  
Rice University



日時: 平成25年7月9日(火) 13:00~14:00  
会場: 東京大学工学部2号館 3階 31A会議室

### 要旨

This talk will describe our recent optical and optoelectronic investigations of films, fibers, solutions, and device structures made from single-wall carbon nanotubes (SWCNTs), either extremely well aligned or enriched in specific types in macroscopic form [1]. We show that an electromagnetic antenna effect, which is negligibly small in individual tubes, is significantly enhanced in a cooperative manner in macroscopic arrays of aligned ultralong SWCNTs, leading to extreme anisotropy in the terahertz (THz) and infrared response [2]. Such aligned films are promising for various photonic applications, including polarizers [3], nonlinear frequency converters [4], and photodetectors [5]. Macroscopic SWCNT films enriched in metallic and semiconducting tubes exhibit distinctly different absorption properties throughout the entire spectral range from the THz to the ultraviolet, allowing us to provide clear-cut answers to some of the spectral features whose origins have been rather controversial. Finally, results of optical-pump/THz-probe studies of these films will be presented, which provide new insight into the ultrafast and non-equilibrium dynamics of photo-created carriers and excitons in SWCNTs in a metallicity-dependent manner.

### References

1. For a review, see, e.g., S. Nanot et al., *Advanced Materials* 24, 4977 (2012) and E. H. Hároz et al., *Nanoscale* 5, 1411 (2013).
2. L. Ren et al., *Physical Review B* 87, 161401(R) (2013).
3. L. Ren et al., *Nano Letters* 9, 2610 (2009); *Nano Letters* 12, 787 (2012).
4. D. T. Morris et al., *Physical Review B* 87, 161405(R) (2013).
5. S. Nanot et al., *Scientific Reports* 3, 1335 (2013).

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  
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)  
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  
E-mail: maruyama@photon.t.u-tokyo.ac.jp Phone: 03-5841-6421  
GMSIプログラム事務局 E-mail: gmsi-office@pcil.t.u-tokyo.ac.jp Phone: 03-5841-0696