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Optical properties of highly-extended, ultrathin graphene nanoribbons in carbon nanotubes HONG EN LIM, Department of Chemistry, Nagoya University, YASUMITSU MIYATA, Department of Physics, Tokyo Metropolitan University, MIHO FUJIHARA, Department of Chemistry, Nagoya University, SUSUMU OKADA, Graduate School of Pure and Applied Sciences, University of Tsukuba, HARUKA OMACHI, RYO KITAURA, HISANORI SHINOHARA, Department of Chemistry, Nagoya University — Growing graphene nanoribbons (GNRs) inside the carbon nanotubes (CNTs) [1, 2] is tempting, as it provides opportunities to tune the width and edge structure of the ribbons synthesized. To have a better insight into their intrinsic properties, it is therefore necessary to study the GNRs in such a confined state. Herein, we report the optical properties of the coronene-derived GNRs, confined in single-wall CNTs of 1.4-1.6 nm. The electronic structures of the outer CNTs were modified using diazonium chemistry [3], allowing clear absorption signals of the inner GNRs to be detected. The absorption bands around 1.5 and 3.4 eV can be related to the first and second transitions between the energy gaps of the valence and conduction bands, in qualitative agreement with the first principle calculations. Our study deepens the understanding on the ribbons fabricated, providing access towards the interesting physics of confined one-dimensional materials. References: [1] H. E. Lim et al. Nat. Commun. 2013, 4, 2548. [2] M. Fujihara et al. J. Phys. Chem. C 2012, 116, 15141-15145. [3] M. S. Strano et al. Science 2003, 301, 1519-1522.

Hong En Lim
Department of Chemistry, Nagoya University

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