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**One-dimensional nature in transport property of SWNT thin film electrochemical transistor** HIDEKAZU SHIMOTANI, SATOSHI TSUDA, Tohoku Univ., HONGTAO YUAN, The Univ. of Tokyo, YOHEI YOMOGIDA, Tohoku Univ., RIEKO MORIYA, Tokyo Metropolitan Univ., TAISHI TAKENOBU, Waseda Univ., KAZUHIRO YANAGI, Tokyo Metropolitan Univ., YOSHIHIRO IWASA, The Univ. of Tokyo — Recent success in isolating single-walled carbon nanotubes (SWNTs) of narrow chirality distribution enabled making pure metallic (m-) and semiconducting (s-) SWNT films. Such films are expected to reflect the nature of individual SWNTs, that is their one dimensional subband structure. Therefore, it is interesting to investigate electronic transport in m- and s-SWNT films by controlling their Fermi level ($E_F$). Chemical doping or FET is unsuitable for the purpose because of the lack of precise and reversible $E_F$ controllability, and the narrow controllable $E_F$ range, respectively. The problems are solved by our electric double layer transistor technique,[1] where the gate voltage ($V_G$) is applied through an electrolyte. The conductance and optical absorption spectra of the resistance of s- and m-SWNT films were measured at various $V_G$. The conductance of the s-SWNT film showed stepwise change against $V_G$. The absorbance spectra indicate the steps correspond to reaching of the $E_F$ to a vHs. Furthermore, even m-SWNT films showed steep increases of conductance, demonstrating that the conductance strongly depend on the subband filling. [1] H. Shimotani et al., Appl. Phys. Lett. 88, 073104 (2006).

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