

Abstract Submitted  
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**State of Upright Metal-Coated Carbon Nanotwists Treated by Dielectric Barrier Discharge** YUKI SUGIOKA, YOSHIYUKI SUDA, HIROFUMI TAKIKAWA, HIDETO TANOUE, Toyohashi University of Technology, HITOSHI UE, Tokai Carbon, Co., Ltd., KAZUKI SHIMIZU, Shonan Plastic Mfg. Co., Ltd., YOSHITO UMEDA, Toho Gas Co., Ltd. — We have used carbon nanotwists (CNTws) as a base material of field emitter (FE), and CNTws were treated with dielectric barrier discharge (DBD) to make CNTws stand up on substrate [1]. In this study, we coated metal on the surface of FE [2] and then treated the FE with DBD. FE was prepared by screen-printing of the CNTw paste to Si or indium-tin-oxide (ITO) substrate. Cu or Pt film was coated on the FE surface by an ion coater, and Al film coated by vacuum evaporation. A thickness was 10 nm. The experimental conditions for the DBD treatment were as follows: discharge gas, N<sub>2</sub>; gas flow rate, 2 L/min; discharge output power, 300 W; process time, 30 s; and gap distance, 0.75 mm. Lengths of upright CNTws ( $L_{CNTw}$ ) between dots with Al, Cu, and Pt were 2.7  $\mu\text{m}$ , 6.9  $\mu\text{m}$ , and 8.1  $\mu\text{m}$ , respectively.  $L_{CNTw}$  on the dot with Al, Cu, and Pt coatings were 2.4  $\mu\text{m}$ , 2.3  $\mu\text{m}$ , and 1.7  $\mu\text{m}$ , respectively. The FE characteristics of the CNTw coated with Cu film were as follows: the threshold electric field, 2.4 V/ $\mu\text{m}$ ; the emission current density at 9 V/ $\mu\text{m}$ , 555.8  $\mu\text{A}/\text{cm}^2$ .

[1] Y. Hosokawa, et al., *J. Phys. D: Appl. Phys.*, **41**, 205418, 2008

[2] Whikun Yi, et al., *Adv. Mater.*, **14**, 1464, 2004

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