Abstract Submitted for the MAR12 Meeting of The American Physical Society

Sorting Category: 12.1.4 (E)

The Ultimate Electron Sources Using Millimeter Long Carbon Nanotubes¹ N. PEREA, Department of Physics, The Pennsylvania State University, USA, B. REBOLLO, J.A. BRIONES, A. MORELOS, D. HERNANDEZ, E. MUNOZ, F. LOPEZ-URIAS, Advanced Materials Department, IPICYT, Mexico, A.R. BOTELLO, J.C. CHARLIER, ICMN, Université Catholique de Louvain, Belgium, V. MEUNIER, Department of Physics, Rensselaer Polytechnic Institute, USA, G.A. HIRATA, CNYN-UNAM, Mexico, B. MARUYAMA, AFRL, Materials and Manufacturing Directorate, USA, M. TERRONES, Department of Physics, The Pennsylvania State University, USA and Exotic Nanocarbon Research Center, Shinshu University, Japan, H. TER-RONES, Department of Physics, The Pennsylvania State University, USA — We are reporting the fabrication of a very efficient electron source using long and crystalline carbon nanotubes. These devices start to emit electrons at fields as low as $0.10 \text{ V}/\mu\text{m}$ and reach threshold emission at 0.164 V/ μ m. In addition, these electron sources are very stable for long operation periods up to 200 hrs and can achieve peak current density of 2 Acm⁻² at only 0.28 V/ μ m. To demonstrate intense electron beam generation, these devices were used to produce white light by cathodoluminescence. Finally, to rational the measured properties in open carbon nanotubes of different lengths we used density functional theory. The modeling establishes a clear correlation between length and field enhancement factor.

¹JST-Japan, AFRL FA9550-08-1-0204, CONACYT: 63001, S-3908, 3072, S-3909, 60218-F1, 48300. N. Perea Prefer Oral Session nup13@psu.edu

X

Prefer Oral Session nup13@psu.edu Prefer Poster Session Department of Physics, The Pennsylvania State University, USA

Date submitted: 03 Jan 2012

Electronic form version 1.4