

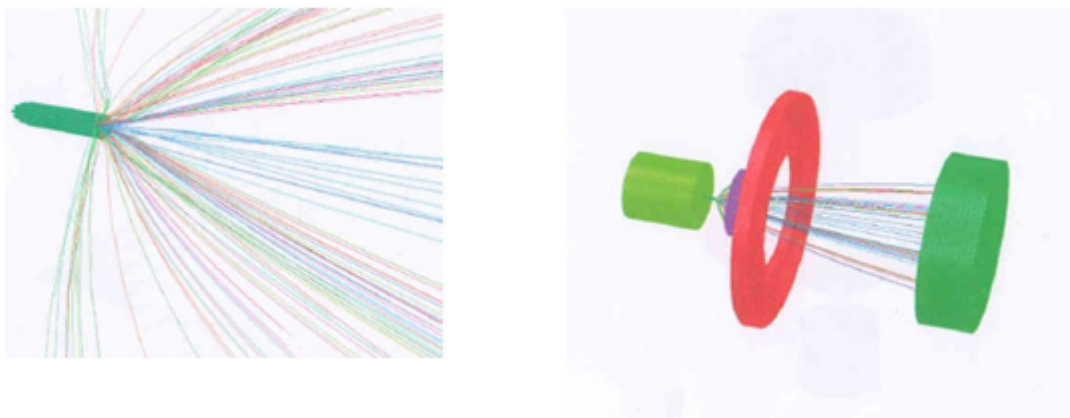
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## A X-ray Tube Using Field Emitter Made by Multi-walled Carbon Nanotube Yarns

Hyun Suk Kim, Edward Joseph D. Castro, Seung im Kwak,  
Jin Young Ju, Yong Gyo Hwang, Choong Hun Lee\*

Regional Innovation Center for Next Generation Industrial Radiation Technology, Division of Microelectronics and Display Technology, Wonkwang University, Iksan 570-749, Korea

Carbon nanotubes (CNT) emitter has widely become an attractive mechanism that draws growing interests for cold cathode field emission.<sup>1,2</sup> CNT yarns have demonstrated its potential as excellent field emitters.<sup>3</sup> Extensive simulations were carried out in designing a CNT yarn-based cathode assembly. The focal spot size dependence on the anode surface of the geometric parameters such as axial distance of the electrostatic focus lens from the cathode and the applied bias voltages at the cathode, grid mesh and electrostatic focus lens were studied. The detailed computer simulations using Opera 3D electromagnetic software<sup>4</sup> had revealed that a remarkable size of focal spot under a focusing lens triode type set-up design was achieved. The result of this optimization simulation would then be applied for the construction of the CNT yarn based micro-focus x-ray tube with its field emission characteristics evaluated.



**Fig. 1.** The X-ray source simulation model using Opera 3D.