

Analysis of a Spun-CNT Based X-ray Source

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In this research we report the significant contribution of the as-spun multi-walled carbon nanotube (MWCNT) on the x-ray images formation using a low tube voltage x-ray source. The MWCNT, which was used for the fabrication of the spun CNT, was grown using a microwave plasma-enhanced chemical vapor deposition machine. Electrical-optics simulation software was utilized to determine the electron field emission trajectory of the triode-structure-as-spun CNT-based x-ray source. It was shown that a significant amount of converging electrons hit the target anode producing a clear x-ray image. These x-ray images were produced at a small amount of anode current of 0.67 mA at a tube voltage of 5 kV with the gate voltage of 0 V. Also, comparisons of the radiographs at various exposure times of the sample were analyzed with and without an x-ray dose filter. Results showed that spatially-resolved images were formed using the as-spun CNT at a low tube voltage with a 54- μ m Al x-ray filter. This study can be used for low-voltage medical applications.

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