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Study of the Electric Field Screening Effect on Nine Carbon Fiber Field Emitters with Non-uniform Height

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Field emitter arrays have the potential to provide high current density, low voltage operation, and high pulse repetition for radar and communication. It is well known that packing density of the field emitter arrays significantly affects the emission current¹. Previously we conducted experiments using two- and four-cathode configurations with same height. With all the fibers having uniform height, it was found that the fibers at the outer edge always dominate the emission, since they experience the least amount of shielding. Here we extend our previous work and present experimental results for nine cathodes in a square and cylindrical configuration. The experiments used nine cathodes with variable spacing and non-uniform height to investigate the effect of electric field screening on current emission. With non-uniform height (i.e. fiber in the middle taller than the rest), the edge effect should be less severe, and each fiber should contribute to the overall emission more equally. Emission characteristic and voltage-current profile are compared to the case of two and four field emitters with same height and variable spacing.

Author: TANG, Wilkin (Air Force Research Laboratory)

Co-authors: Dr SHIFFLER, Donald (Air Force Research Laboratory); Mr GOLBY, Ken (Leidos Inc.); Mr LA-COUR, Matthew (Leidos Inc.); Mr KNOWLES, Tim (Energy Science Laboratories Inc.)

Presenter: TANG, Wilkin (Air Force Research Laboratory)

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