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Field Emission Enhancement and the Field-Screening Effect Reduction using Carbon Nanopipettes as Cold Cathodes ABDELILAH SAFIR, ElectroOptics Research Institute and Nanotechnology Center, University of Louisville, DAVID MUDD, MEHDI YAZDANPANAH, VLADIMIR DOBROKHOTOV, GAMINI SUMANASEKERA, ROBERT COHN — In this work, we report a recent experimental study of high emission current densities exceeding 10mA/cm^2 and breakdown electric field lower than 5Volts/μm from novel cold cathodes such as conical shaped carbon nanopipettes (CNP). CNP were grown by CVD on Pt wire and have apex as sharp as 10nm with length between 3-6μm. The emission experiments were conducted under vacuum in a scanning electron microscope for individual CNP and in a dedicated chamber for bulk samples. CNP's conical bases and low density contribute significantly to the reduction of the screening effect and to the field emission enhancement. The experimental value for the field enhancement factor, γ, was about 867. Comparing emission results taken from CNP and aligned multiwall carbon nanotubes (MWNT) show that the ratio between γ_{CNP} and γ_{MWNT} is $\sim$1.6 which contributes to the reduction of screening effect. The emission from multilayers of graphene was also studied. High emission current (20μA) demonstrates promising emission properties of graphene.

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