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Electron emission due to femtosecond laser assisted photoemission from tungsten and carbon cathodes JENNIFER ELLE, ADRIAN LUCERO, WILKIN TANG, ANDREAS SCHMITT-SODY, DON SHIFFLER, Air Force Research Laboratory/Directed Energy Directorate, DANIEL ENDERICH, University of Madison, TIM KNOWLES, Energy Science Laboratories Inc — Electron emission under the influence of an ultrashort pulsed laser for single and double tipped carbon fiber and tungsten cathode field emitters has been studied to characterize the effect of electric field screening. Each cathode tip is illuminated by a 50fs, 800nm laser pulse and the emitted current is measured as a function of applied DC bias voltage and laser energy. In addition, emission current is also measured as a function of the time delay between femtosecond laser pulses for the double tip experiments. The single tip experiments show the emission mechanism changes from multiphoton emission to single photon assisted tunneling emission as laser energy increases. For the double tip measurements, our previous work showed that electric field screening between the cathodes plays a significant role in the emitted current characteristic under DC conditions. Here, we study the effect of the electric field screening on the ultrashort time scale, where the light transit time between the two cathodes is longer than the duration of the laser pulses. Theoretical analysis is performed for comparison with experiments.

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