Abstract Submitted
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Quantum Simulation of Field Emission in Microscale Gas Discharges[1] YINGJIE LI, DAVID GO, University of Notre Dame — Field emission can be a critical cathode process in microscale gas discharges, especially for electrode gaps less than 10 μm. In this work, ion-enhanced field emission is determined by solving the one-dimensional Schrodinger's equation. In most prior work, a linear approximation for the ion potential has been coupled with the Fowler-Nordheim equation, but this does not realistically account for the form of potential barrier, and underestimates the impact of the ion's potential well. Here, the tunneling behavior is more accurately represented by determining the wave function of the electrons inside and outside of the cathode in order to predict the emission current. Using this approach, microscale breakdown theory is revisited, in order to understand the deviation from classic breakdown theory at microscale dimensions.

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