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标题: High-Yield Transfer Printing of Metal-Insulator-Metal Nanodiodes

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摘要: Nanoscale metal-insulator-metal (MIM) diodes represent important devices in the fields of electronic circuits, detectors, communication, and energy, as their cutoff frequencies may extend into the "gap" between the electronic microwave range and the optical long-wave infrared regime. In this paper, we present a nanotransfer printing method, which allows the efficient and simultaneous fabrication of large-scale arrays of MIM nanodiode stacks, thus offering the possibility of low-cost mass production. In previous work, we have demonstrated the successful transfer and electrical characterization of macroscopic structures. Here, we demonstrate for the first time the fabrication of several millions of nanoscale diodes with a single transfer-printing step using a temperature-enhanced process. The electrical characterization of individual MIM nanodiodes was performed using a conductive atomic force microscope (AFM) setup. Our analysis shows that the tunneling current is the dominant conduction mechanism, and the electrical measurement data agree well with experimental data on previously fabricated microscale diodes and numerical simulations.

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