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A Focused Asymmetric Metal-Insulator-Metal Tunneling Diode: Fabrication, DC Characteristics and RF Rectification Analysis

Source

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Abstract

Asymmetric thin-film metal-insulator-metal (MIM) tunneling diodes have been demonstrated using the geometric field enhancement (GFE) technique in a Ni/NiO/Ni structure. The GFE technique provides several benefits: generating asymmetric tunneling currents, lowering tunneling resistance, increasing non-linearity, enhancing the effective ac signal amplitude, and improving zero-bias rectifying performance. The GFE technique can be merged with a dissimilar electrode method and use surface plamon resonances for further performance improvement. In this paper, we disclose techniques for fully exploiting all these advantages. Detailed descriptions of process flows are provided. Performance improvements are experimentally verified by measuring the static current-voltage and dynamic (6.4 GHz) response of the developed Ni/NiO/Ni tunnel diodes.