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초박막 절연층을 가진 금속-절연체-금속 소자에서 Al과 Nb 전극에 따른 터널링 누설 전류 특성 연구

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We have studied transport in Al and Nb based metal-insulator-metal tunnel junctions. Deposition of Al and Nb thin films is done using angle evaporation through a suspended mask formed in a Ge layer supported by a thermally stable polymer while the tunnel barrier is formed by thermal oxidation of the bottom Al layer. After oxidation, we deposit Al or Nb top layer. We measure the current-voltage (*I-V*) characteristics of the junctions in the wide range of temperatures, 10 K ~ 300 K. Comparing the measured *I-V* characteristics with the modeled ones using transfer matrix technique and Simmon's image force correction. We extract basic junction parameters, such as the barrier height and width. The measured and modeled *I-V* curves are in good agreement in the entire range of temperature. When Nb is deposited directly on the Al oxide layer, the potential barrier becomes asymmetric and its height is significantly lower than that of the Al/AlO_x/Al junction.