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标题: Scandate Dispenser Cathode Fabrication for A High-Aspect-Ratio High-Current-Density Sheet Beam Electron Gun
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摘要: A high-current-density scandate tungsten dispenser cathode was used for the demonstration of a 25 : 1-aspect-ratio 750-A/cm(2)-current-density sheet beam for the Defence Advanced Research Project Agency High-Frequency Integrated Vacuum Electronics (HiFIVE) program intended for the realization of a wideband (similar to 30%) 220-GHz traveling wave tube. The elliptical cathode with homogeneous microstructure was made from 1-2-mu m-size tungsten powder added with nanosized Scandia using the sol-gel method; it has a current density of up to 160 A/cm(2) at 1050 degrees C. A sheet beam gun analyzer was built to test the terahertz sheet beam gun and determine the size and current density of a sheet electron beam produced by the impregnated scandate tungsten dispenser cathode. A sheet electron beam with an aspect ratio of 12.5 : 1 with a current density exceeding 375 A/cm(2) has been obtained using a BVERI impregnated scandate dispenser cathode without magnetic compression; further magnetic field compression would give the final current density of 750 A/cm(2).
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