

FIELD EMISSION ELECTRON SOURCE

Abstract

There is provided a field emission electron source at a low cost in which electrons can be emitted with a high stability and a high efficiency and a method of producing the same. In the field emission electron source, a strong electric field drift part 106 is formed on the n-type silicon substrate on the principal surface thereof and a surface electrode 107 made of a gold thin film is formed on the strong electric field drift part 106. And the ohmic electrode 2 is formed on the back surface of the n-type silicon substrate 101. In this field emission electron source 110, when the surface electrode 107 is disposed in the vacuum and a DC voltage is applied to the surface electrode 107 which is of a positive polarity with respect to the n-type silicon substrate 101 (ohmic electrode 2), electrons injected from the n-type silicon substrate 101 are drifted in the strong electric field drift part 106 and emitted through the surface electrode 107. The strong electric field drift part 106 comprises a drift region 161 which has a cross section in the structure of mesh at right angles to the direction of thickness of the n-type silicon substrate 1, which is an electrically conductive substrate, and a heat radiation region 162 which is filled in the voids of the mesh and has a heat conduction higher than that of the drift region 161.

Fig. 2