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ABSTRACT

Disclosed is an electron source 10 including an electron source element 10a formed on the side of one surface of an insulative substrate 1. The electron source element 10a includes a lower electrode 2, a composite nanocrystal layer 6 and a surface electrode 7. The composite nanocrystal layer 6 includes a plurality of polycrystalline silicon grains 51, a thin silicon oxide film 52 formed over the surface of each of the grains 51, a number of nanocrystalline silicons 63 residing between the adjacent grains 51, and a silicon oxide film 64 formed over the surface of each of the nanocrystalline silicons 63. The silicon oxide film 64 is an insulating film having a thickness less than the crystal grain size of the nanocrystalline silicon 63. The surface electrode 7 is formed of a carbon thin film 7a laminated on the composite nanocrystal layer 6 while being in contact therewith, and a metal thin film 7b laminated on the carbon thin film 7a.