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(54) Electron source device

(57) A self-aligned electron device (10) includes emitter (13), extraction electrode (17), and focus electrode (21) separated by dielectric layers, (11, 15, 19). A single cavity (23) extending through the electrodes and the dielectric layers and terminating at the emitter electrode (13) is formed by a single photolithography step and an etching process. A composite emitter (1) including a base (3) disposed on the emitter electrode (13) and a conical tip (5) disposed on the base (3) and terminating at a vertex V is formed in the cavity (23). The base (3) can be made from materials including titanium, chromium, or doped silicon. The tip (5) can be made from a wide variety of materials including a refractory metal, a metal alloy, a silicon alloy, a carbide, a nitride, or an electroformable metal. The cavity (23) and the composite emitter (1) are self-aligned relative to each other. The dielectric layers can be etched back to reduce or eliminate charge accumulation on cavity-facing portions (43, 45) of the dielectric layers. A composite layer including a dielectric and mechanical strength enhancement layer (15a, 19a) of silicon nitride or silicon carbide and a pull-back layer (15b, 19b) of silicon oxide on top of the etch stop layer can be used to form the dielectric layers.

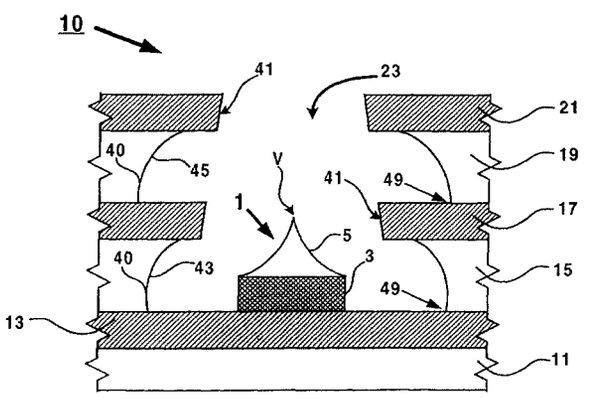

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 6009

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	8 July 2002	Weisser, W

CATEGORY OF CITED DOCUMENTS

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