

Field Emission Study of DLC-coated Nanosize Si-tip

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Recently there have been significant interests for field emission studies due to potential applications for nano-lithography and flat panel electronic devices. Especially due to Si microfabrication technology, numerous researches on the cold cathode Si tip have been performed. Though its unstability and high work function hindered development of the cold emitter.

A Si-tip with nanosize radius was fabricated using photolithography, reactive ion etching(RIE), and sharpening oxidation followed by oxide etching by buffered hydrofluoric acid. The first fabrication process is the growth of 1000 Å of a thermal SiO₂ as a masking film on the surface of (100) Si wafer. The radius of mask for the tip is about 2.5 μm radius. The isotropic characteristics of the SF₆ plasma etching was utilized in order to get a very sharp Si post. For sharpening oxidation procedure, a sharpening oxidation at 900°C followed by BHF oxide etching was performed. The deposition of the DLC film on the Si tip will be performed at room temperature. In this report, field emission characteristics from a Si tip and a diamondlike carbon(DLC)-coated Si will be presented.