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# Reverse electrochemical etching method for fabricating ultra-sharp platinum/iridium tips for combined scanning tunneling microscope/atomic force microscope based on a quartz tuning fork

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## Abstract

Sharp Pt/Ir tips have been reproducibly etched by an electrochemical process using an inverse geometry of an electrochemical cell and a dedicated electronic device which allows us to control the applied voltages waveform and the intensity of the etching current. Conductive tips with a radius smaller than 10 nm were routinely produced as shown by field emission measurements through Fowler-Nordheim plots. These etched tips were then fixed on a quartz tuning fork force sensor working in a qPlus configuration to check their performances for both scanning tunneling microscopy (STM) and atomic force microscopy (AFM) imaging. Their sharpness and conductivity are evidenced by the resolution achieved in STM and AFM images obtained of epitaxial graphene on 6H-SiC(0001) surface. The structure of an epitaxial graphene layer thermally grown on the 6H-SiC(0001) View the MathML source(63×63) R30° reconstructed surface, was successfully imaged at room temperature with STM, dynamic STM and by frequency modulated AFM.

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