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Room temperature in-situ growth of single Ag₂Ga needles on AFM tips MEHDI M. YAZDANPANA, STEVEN A. HARFENIST, ABDELILAH SAFIR, ROBERT W. COHN — We have found that single metallic nanowires can be grown in various directions, including sticking straight out from the end of a sharp (or for that matter blunt) tips, e.g. atomic force microscope (AFM) tips or even tipless AFM cantilevers. This is done by coating a silicon cantilever with a thin film of silver (with an underlying chrome flash to promote adhesion). Then the tip is dipped in a small drop of melted gallium (at or near room temperature) for 5 minutes. The tip is removed at one micron per second, and a single nanoneedle is found formed on the tip in at least 50% of the experiments. Faceted nanoneedles have been formed from 1 to 20 microns in length and 45 to 300 nm in diameter. In-situ scanning electron microscopy is used to observe the growth and mechanical properties of the needles and transmission electron microscopy shows the needles to be single crystal. Contact and non-contact mode AFM imaging and voltage lithography with these needle-tipped cantilevers is reported.

Mehdi M. Yazdanpanah
U. Louisville

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