Supplementary Materials for

Nanofabrication of high Q, transferable, diamond resonators

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This PDF file includes

Supplementary Text

Figures S1

This supplementary material contains additional information detailing the Fabrication outcomes.

1- High magnification images of nanobeam cavities

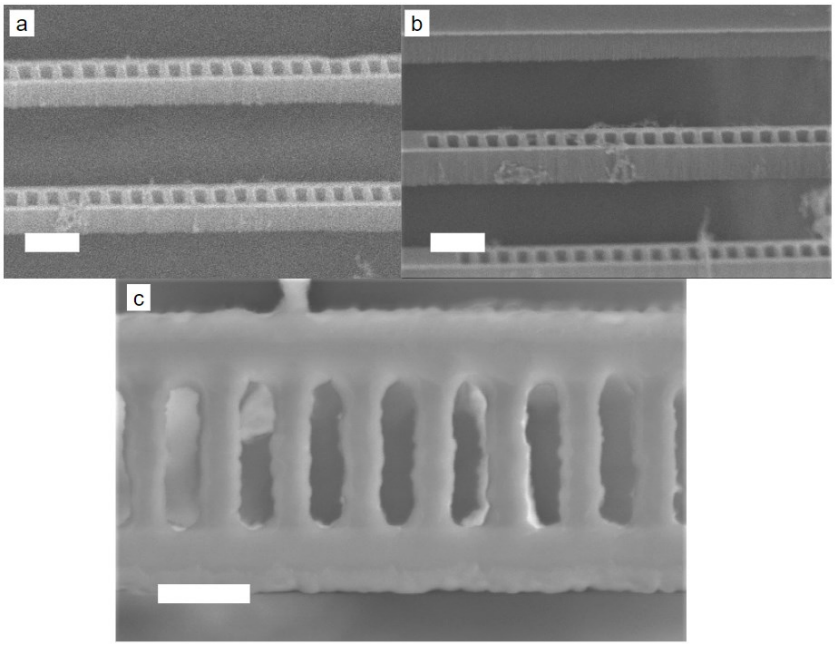

Figure S1. High Magnification images of diamond nanobeams. a) 45 degree offset angle image of dual nanobeam structures before wet chemical mask removal, Scale bar represents 500nm b) 45 degree offset

image of diamond nanobeams after mask removal, minimal change to structure imposed by wet chemical process, Scale bar represents 500nm. c) high magnification image highlighting nanobeam structure post mask removal, surface roughness a product of etching and residue from wet chemical steps, scale bar represents 100nm.

Figure S1 highlights the final structure of an individual nanobeam generated through the tungsten fabrication process highlighted in the manuscript. These high magnification images show the effect of mask removal on the tungsten structure. First, Figure s1 a and b show the before and after of mask removal via hydrogen peroxide, demonstrating minimal change in the primary structure. During the curse of wet chemical processing, contamination residing on the substrate is lifted off and redistributed, with an unfortunate preference to collect on the nanostructures, this is the cause for the increased contamination on the nanobeam structure. Figure S1 c shows a far higher magnification image of the same structure, showing both the scale of the structure, and the apparent roughness. This roughness is due to not only innate fabrication errors caused by mask redeposition and surface imperfections from the membrane, but is also from residue deposited during the wet chemical process. While efforts are taken to prevent The buildup of residue, including water washes and the removal of the droplet before drying, a small degree of buildup is expected.

Other masking material.

Silicon/Silicon dioxide can be readily etched with SF6 and can be patterned through HSQ. This material however is susceptible to wear during Oxygen etching from the physical etch component, which can roughen the mask and limit the quality of fabricated devices. And finally, the removal of Silicon/SiO2 typically required HF acid, which is famously dangerous, or KOH, which requires long etching periods at elevated temperatures, making it less than ideal for gentle mask removal. Si3N4 has similar properties, and similar drawbacks.