# Gallium and inert-gas FIB methods for superconducting, nanomechanical and plasmonic devices

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**Abstract**
Focused-ion-beam (FIB) nanofabrication, by virtue of the fact that no resist is used, is particularly flexible for fabrication of three-dimensional nanostructures. In the case of FIB deposition, complex shapes can be deposited by shifting the ion beam during deposition. Similarly FIB milling can be used to sculpt three-dimensional structures by changing the angle of ion-beam incidence with respect to the sample surface.

Here I will give examples of our work on three-dimensional FIB nanofabrication including:

(a) FIB-deposition of three-dimensional superconducting pick-up loops for vector SQUID magnetometry;

(b) Lateral-incidence FIB-milling of FIB-deposited nanomechanical resonators so as to reduce their diameter.

Potential advantages of gallium-FIB techniques over electron-beam lithography (EBL) in planar nanofabrication are however offset by the disadvantages of ion implantation. I will discuss our experiments on fabrication of tuneable nanoplasmonic devices using gallium FIB, neon FIB and EBL patterning methods to illustrate this.

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