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High speed focused ion and electron beam nanofabrication[1]

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Both focused ion beams and electron beams can be used for direct, maskless, resistless nanofabrication as well as for lithography. So far the direct fabrication has been limited to applications such as photomask repair, circuit restructuring, failure analysis, and the creation of various highly specialized structures. Recent developments in maskless fabrication, so far aimed mainly at to resist exposure, suggest that this picture might change. For example, IMS in Vienna, Austria is developing an instrument that can be characterized as an ion beam or electron beam dot matrix printer. The total current on the sample available from this kind of instrument is at least three orders of magnitude larger than from a single beam instrument. This may lead to new applications of charged particle beam fabrication, as well as enable applications considered in the past but rejected because of very low throughput. An example of one such application is the direct writing of the identity in RFID tags using ion beam implantation. Recently we have also shown that electron beams can be used to deposit relatively pure platinum from an inorganic precursor gas, $Pt(PF_3)_4$. Such metal deposits can be used as contacts to carbon nanotubes, semiconductor nano wires, organic fibers, or other structures where conventional lithography is impractical.

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