

Title: The creation of micro and nano scale structures using a direct write deposition technique with ions or electrons

Abstract:

Electron or ion beam induced deposition refers to a technique where locally supplied precursor gas molecules, adhered to the sample surface in a SEM or FIB, are decomposed by the beam, creating a non-volatile deposition on the surface and a volatile component that is pumped away by the vacuum pump of the system. This technique allows the single-step creation of 3D structures by direct control of the position and dwell time of the beam using a dedicated patterning engine. It is possible to create both nano and micro-scale structures and a variety of materials is available depending on the required functionality such as electrical conduction (for contacting nano wires), electrical isolation (to separate the contacts from the substrate), magnetic behavior (for example for domain wall pinning) and for plasmonic behavior using for example small nano scale Au antennae. Research in the deposition technology has focused on improving the purity of the deposited material to obtain the required local property of interest and on expansion to new interesting materials such as Pd and TiO₂. In this tutorial the basic principles will be discussed and ion and electron beam related techniques will be compared. An overview will be given on the progress of purification strategies and the current boundaries of the technique and any side effects that have to be taken into account.

About FEI

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When he joined Philips in April 86 he was focusing on electron microscopy and have worked in the demonstration lab on SEM, EDX, WDX, EBSD etc for several years, followed by product management and product line management. After this period he returned from the commercial side of the business back to the technical area of application development, working on new areas for FIB, for electron beam induced deposition and now working on low energy ions and Raman spectroscopy. He works with various university parties over Europe on new technologies.