

# NETWORK: NanoFIB – The nano-processing and nanoanalysis of materials using focused ion beams



## EPSRC Report : Summary of Outcomes

The development of nanotechnology depends crucially on the emergence of new technologies to fabricate and analyse devices with nanometre-scale spatial resolution. Nano-processing using a focused ion beams (FIB) is a rapidly emerging area which has far-reaching applications in the nanotechnology sector. The value of FIB technology to the scientific community is as a unique interactive tool for *in-situ*, site-specific fabrication, nanomachining and microstructural analysis of nanodevices and nano-objects, with a resolution better than 10nm (a millionth of a centimetre).

Five years ago FIB activity in the UK was limited and highly fragmented, split between a few semiconductor companies and a handful of large Universities operating independently from one another. One of the key objectives of the NanoFIB Network has been to redress this situation, and the primary outcomes of this project have been:

1. The establishment of a U.K.-based NanoFIB Network as a forum for the synergistic transfer of technology and scientific ideas between academic FIB users, industrial users and FIB system suppliers. During its EPSRC-funded lifetime the Network has grown almost 10-fold from 25 to 220 members, of which 44% are from Academia, 27% PhD students and 29% from Industry.
2. The organisation of 7 very successful international research meetings to promote FIB-science in the UK. Network meetings have generated much more cohesion within the UK FIB community, and have provided a platform for the promotion of UK FIB research to the world-wide FIB community, increasing the UK's profile and standing.
3. The identification and promotion of key emerging new interdisciplinary FIB research topics, relevant to both UK academia and industry during the Network meetings. Network meetings have stimulated considerable scientific discussion, and the increased interaction between members has led to new scientific collaborations between academia and industry ensuring more effective exploitation of FIB technology in UK research.
4. The education and training of UK academics and industrialists (SMEs) new to the FIB field, in both FIB instrumentation and techniques. The NanoFIB Network has played a key role in the UK in spreading knowledge of the availability and usefulness of FIB, and has supported new members applying for FIB instrumentation. During the Network lifetime, the number of FIB systems in UK academia has almost tripled, representing a UK investment of probably at least £15 million in the last 4 years. The influx of new academics is adding greatly to the interdisciplinary nature of UK FIB research, and the rapid expansion in instrumentation is increasing the accessibility of FIB to UK SME industrialists.
5. The education and training of UK PhD students and young U.K. scientific researchers working in the growing FIB nanotechnology field, broadening their scientific and technological skills and linking them more closely to UK industry and established academics. The Network PhD membership has grown to 59 in Dec'05, and over 50 travel bursaries have been awarded for attendance at Network and related FIB meetings. A Network FIB Training day (Instrumentation and Techniques) was highly successful.
6. The enhanced knowledge of Network members about each others FIB activities though people networking at meetings. This has greatly aided the promotion of FIB to the younger generation (especially when job-seeking), and the improved profile of FIB as a 'unified' research community has probably increased its attractiveness as a 'career-path'.
7. The establishment of a central website ([www.nanofib.org](http://www.nanofib.org)) and email database for promotion of UK FIB activities.

Growth in members of the NanoFIB Network over the period Jun'03 to Dec'05.

