SEM characterization of mm-long nanowires

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The fabrication of optical fibre nanowires has recently attracted much attention [1-5]. Nanowires longer than 110mm [2] and with diameters smaller than 20 nm [5] have now been fabricated using a top-down approach. Because of the extraordinarily large ratio between length and diameter (>100000), the characterization of optical fibre nanowires requires instrumentation capable of measuring lengths over a range spanning more than five orders of magnitude. In our experiments dimensional characterization along the nanowire has been performed using an SEM and calibrated references. The samples are first attached to conductive carbon pads to avoid electrostatic build-up. Charging makes accurate metrology difficult because the electron beam can be deflected by the induced electric field on the sample. Fig. 1 illustrates a nanowire with a radius r=30nm wrapped around a microfibre with r=2μm. Variations in radius of another nanowire along its length are shown in fig. 2.

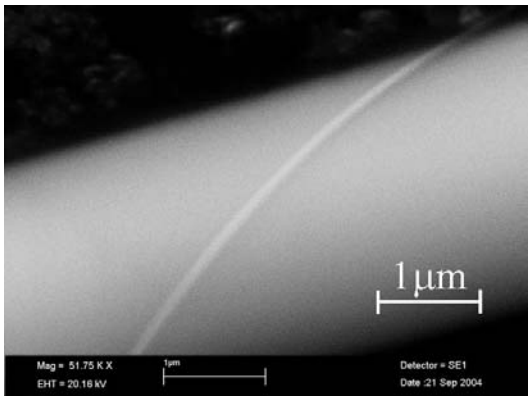

Fig.1 – A fibre nanowire with r=30nm.

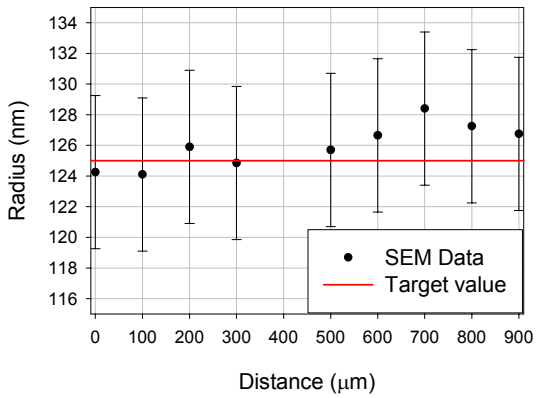

Fig.2 – Nanowire uniformity along its lenght.

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