

SEMINAR

Multiple double cross-section transmission electron microscope sample preparation of sub-10 nm diameter Si nanowires devices

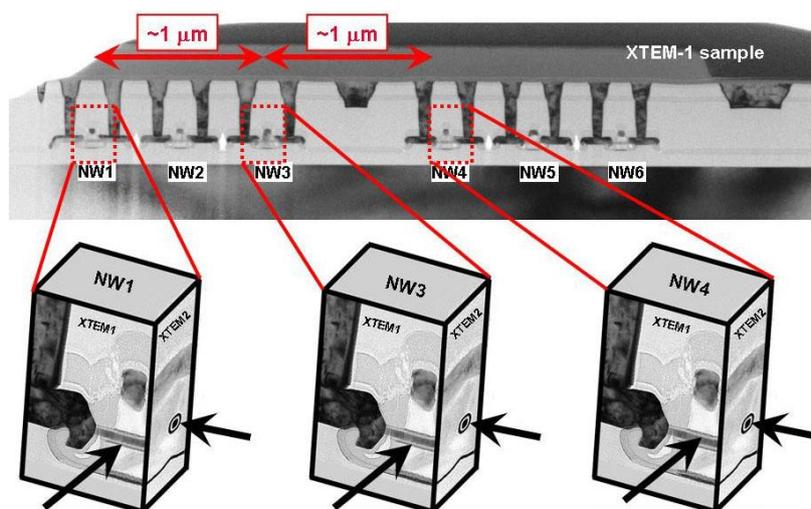
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11am – 12noon

Science Lecture Theatre S11, Building 25

Abstract

As advanced semiconductor (S/C) devices continue to evolve toward smaller dimensions and non-planar structures, physical characterization of the devices requires transmission electron microscope (TEM) imaging and the ability to image the structures in three dimensions. One S/C device process scheme currently under development is a Si nanowire (NW) gate-all-around metal-oxide field effect S/C transistor where a source is connected to a drain through a Si NW channel with a gate wrapping around the NW. TEM characterization of a NW device requires cross-section TEM (XTEM) samples in two directions 90° from one another: XTEM1 sample sectioned along the device channel to measure the device gate length and XTEM2 sample sectioned perpendicular to the channel to measure the Si NW diameter and gate film thicknesses. For improved understanding of the electrical measurements, it is beneficial to have both sections from the same electrically tested device. To this end, a multiple double XTEM sample preparation method was developed to study sub-10 nm diameter Si NW devices. This technique demonstrated the ability to obtain high resolution TEM images in directions 90° from one another of multiple, specific sub-10 nm features that were spaced 1.1 μm apart.



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