

Exploring Single Semiconductor Nanowires with a Multimodal Hard X-ray Nanoprobe

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Semiconductor nanowires offer new opportunities for optoelectronic and spintronic nanodevices. However, their full potential is ultimately dictated by our ability to control multiple property-function relationships taking place at the nanoscale in the spatial and time domains. Only a combination of high-resolution analytical techniques can provide a comprehensive understanding of their complex functionalities. Here we describe how a multimodal hard X-ray nanoprobe (Figure 1) addresses fundamental questions in nanowire research. Selected topics ranging from cluster formation, dopant segregation, and phase separations to quantum confinement effects are investigated with sub-100 nm spatial resolution and sub-50 ps temporal resolution. This approach opens new avenues for structural, composition and optical studies with broad applicability in materials science.

References

- [1] G. Martinez-Criado et al., *Advanced Materials*, DOI: 10.1002/adma.201304345 (2014).

