

2016 National Research Infrastructure Roadmap Capability Issues Paper

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Thank you for the opportunity to respond to the 2016 National Research Infrastructure Roadmap Capability Issues Paper.

In response, I have addressed the question around my research area.

Advanced Physics, Chemistry, Mathematics and Materials

Question 21: Are the identified emerging directions and research infrastructure capabilities for Advanced Physics, Chemistry, Mathematics and Materials right? Are there any missing or additional needed?

As the Founding Director of UNSW's Centre for Sustainable Materials Research and Technology (SMaRT) I work on the sustainable use of materials and processes with an emphasis on environmental and community benefits. For example, we invented the worlds' first, environmentally friendly process for recycling end-of-life plastics and rubber tyres in steelmaking.

The Centre for Sustainable Materials Research and Technology aims to transform Australia's manufacturing sector, by introducing micro-factory concept. In this concept end-of-life products will reform to a value added components locally in a micro-scale facilities. The output can be used as its own or worth to transport to mega-factories as input materials.

Central to this work is establishing fundamental understanding of material behavior at micro and nano-scale at various conditions. This new innovative solution and approach needs some sophisticated instrument and facilities such as electron microscopy.

Our research needs the latest generation of electron microscopy and sample preparation equipment. Especially, high resolution transmission microscopy to understand the nature of our materials and focused ion beam (FIB) instrumentation to prepare the samples. This research will be transformed by access to the latest generation aberration-corrected transmission electron microscopy (TEM). The proposal of AMMRF for this aberration corrected TEM and FIB infrastructure will be critical for our future research. We have greatly benefitted from access to the current generation of instruments that are openly available through the AMMRF and encourage NCRIS to renewed investment in the AMMRF for the next generation of microscopy.