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. My answer refers to only the question that I consider relevant to our activities.

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?

At the Australian National University we have a large group of about 60 people focusing on solar energy research, with the aim of make photovoltaic solar energy more efficient and cheaper. We have two major research directions, silicon solar cells and perovskite solar cells. To progress our research in these directions we partner with major solar cell companies and start-ups to commercialize our discoveries.

Microscopy and micro-scale analysis are an essential part of this work. For each of the areas of our research, we make use of microscopy and microanalysis in order to obtain crucial information about the solar cell structure and composition, as we develop new technologies. In particular we use scanning electron microscopy and focused ion beam milling to examine the solar cell structure, and energy dispersive X-ray analysis and cathodoluminescence to determine solar cell composition on the microscale. Important future additions would be focused ion beam mass spectrometry, to enable quantitative information on the composition of materials as a function of depth. This is needed because many of our samples show variation with depth because of the deposition techniques used.

Overall therefore we need access to the latest microscopy equipment, and the AMMRF provides this through a simple open access model with affordable rates, and crucially, trained staff with expertise on all of the equipment. Our need for microscopy and high end characterization equipment will continue as the importance of solar energy technology continues to grow. Therefore it is crucial to maintain the continued support of national microscopy facilities in the 2016 NCRIS roadmap.