The Australian Microscopy & Microanalysis Research Facility (AMMRF) – A National Core Facility

Eleanor P. W. Kable* and Paul J. Rigby**

*Australian Centre for Microscopy and Microanalysis, The University of Sydney, NSW 2006, Australia. **Centre for Microscopy, Characterisation and Analysis, The University of Western Australia, WA 6009, Australia.

The important role core facilities play in helping resource and support researchers to solve complex research problems cannot be over emphasised, The AMMRF is a national grid of microscopy and microanalysis instrumentation and expertise that provides micro- and nano-structural characterisation capability and services; including widely used optical, electron, X-ray and ion-beam techniques and world-leading flagship platforms. The latter include pulsed-laser local-electrode atom probe, high-throughput cryo-TEM, high-resolution SEM and spectroscopy, as well as high-precision ion probes. These resources are available to the entire Australian research community with international scientists also accessing this equipment.

In this presentation we highlight two of the AMMRF nodes that have a particular emphasis on light and optical microscopy: the Australian Centre for Microscopy and Microanalysis (ACMM) at the University of Sydney, and the Centre for Microscopy, Characterisation and Analysis (CMCA) at The University of Western Australia (Fig 1).

In the last 10 years, light and optical capability has grown almost exponentially, particularly in advanced biomolecular microscopy. Techniques that were at the cutting edge only five years ago are now considered to be routine, while more complex and innovative techniques are continually being developed. While the "stationary" 3D confocal microscope image of stained samples continues to provide crucial data, researchers now have a raft of specialised techniques at their disposal including live cell multi-dimensional imaging, flow cytometry, sub-resolution imaging, FRAP, FRET, FLIM, and FPALM. Indeed, it is now possible for researchers to move almost seamlessly from optical to electron microscopy and beyond.

Successful research outcomes, however, do not arise from simply accessing appropriate instrumentation; access to expert technical support and high level academic advice and guidance is essential. The AMMRF provides this wide-ranging support through its nodes which are distributed across the country. Specialist focus groups have been formed and comprise staff from across different nodes with interests and expertise in different microscopy platforms. Cumulatively, these staff have a vast wealth of knowledge on different instruments from different suppliers, and frequently travel between nodes to train and support each other. When the expertise is not found within the AMMRF, staff are supported to travel overseas to acquire the appropriate knowledge and skills. For example, the authors of this presentation are currently embedded in US laboratories learning new techniques. As a consequence of this strategic approach to training, the AMMRF staff are able to stay at the forefront of current technological advances, not only at the instrumentation level but also in specimen preparation and analyses.

As recently stated in a microscopy view-of-point paper by AMMRF colleagues[1], "The optimal approach to research with advanced molecular microscopy is a collaborative one. When combined with regular training and up-skilling, such a collaborative approach generates the highest-quality research and forms an ideal setting for training biologists in new technologies. A core task for the next-generation microscopist is to navigate the inexperienced researcher through the ocean of techniques, fully informed of the strengths and limitations of each approach, thereby avoiding generation of "false results" in the complex world of microscopy and microanalysis[1]"

1. Braet F, Ratinac K. *J Cell Mol Med*, 11 (2007) 759.

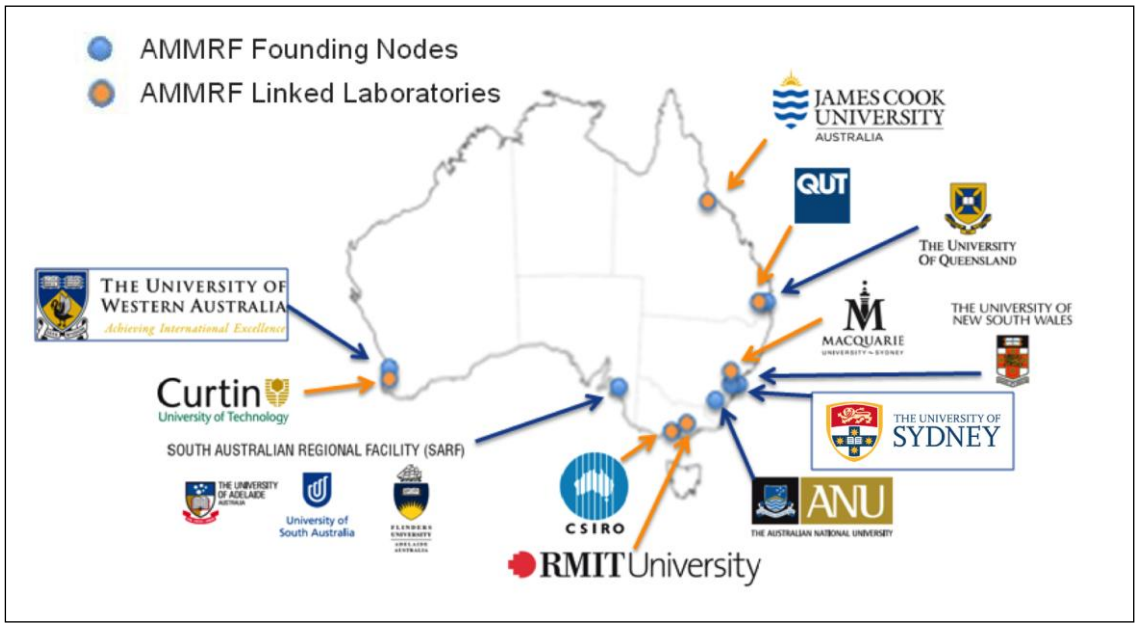

Fig 1. AMMRF Nodes and Linked Laboratories