Establishment of the Neutron Beam Research Facility at the OPAL Reactor

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Australia's first research reactor, HIFAR, reached criticality in January 1958. At that time Australia's main agenda was establishment of a nuclear power program. HIFAR operated for nearly 50 years, providing a firm foundation for the establishment of Australia's second generation research Reactor OPAL, which reached criticality in August 006. In HIFAR's early years a neutron beam facility was established for materials characterization, partly in aid of the nuclear energy agenda and partly in response to interest from Australia's scientific community. By the time Australia's nuclear energy program ceased (in the 1970s), radioisotope production and research had also been established at Lucas Heights. Also, by this time the neutron beam facility for scientific research had evolved into a major utilization programme, warranting establishment of an independent body to facilitate scientific access (the Australian Institute for Nuclear Science and Engineering). In HIFAR's lifetime, ANSTO established a radiopharmaceuticals service for the Australian medical community and NDT silicon production was also established and grew to maturity.

So when time came to determine the strategy for nuclear research in Australia into the 21st century, it was clear that the replacement for HIFAR should be multipurpose, with major emphases on scientific applications of neutron beams and medical isotope production. With this strategy in mind, ANSTO set about to design and build OPAL with a world-class neutron beam facility, capable of supporting a large and diverse scientific research community.

The establishment of the neutron beam facility became the mission of the Bragg Institute management team. This journey began in 1997 with establishment of a working budget, and reached its first major objective when OPAL reached 20 MW thermal power nearly one decade later (in 2006). The first neutron beam instruments began operation soon after (in 2007), and quickly proved themselves to be far more powerful than their predecessors at HIFAR, and to perform at levels comparable to the leading neutron beam facilities around the world. Since then the beam facility has continued to grow in technical capability and in quality, while at the same time the Bragg Institute has grown to rank amongst Australia's most respected materials research institutes.

The scientific user program now involves seven working instruments, available for over 200 days per year for peer reviewed research, with popularity such that all instruments have a healthy waiting list of researchers eager to obtain the unique scientific information provided by neutron scattering. Furthermore have continued the investment in scientific infrastructure at a rapid pace, and we anticipate bringing six more instruments into service over the next three years. There is even growth potential beyond that, which will allow OPAL to remain in service, providing high quality scientific solutions for researchers up to the middle of this century.

The presentation will outline how ANSTO achieved our success in this ambitious landmark scientific development for the Australian Community, and will discuss how we plan to steer developments at OPAL and within the Brag Institutes, to ensure maximum return on the investment over the next 30–40 years.

FIG. 1. The OPAL research reactor, viewed from the main entrance at night.

References

[1] The Bragg Institute web page, http://www.ansto.gov.au/bragg/.