Scientific Highlights from QUOKKA, 40m Pinhole Small Angle Neutron Scattering (SANS) Instrument

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QUOKKA is the 40 m pinhole SANS instrument located at the OPAL reactor in Australia, serving the growing needs of both domestic and international users [1, 2]. Calibrated absolute scattering intensity measurements may be made over a standard range of scattering vectors, q (4×10^{-3} Å^{-1} < q < 0.7 Å^{-1}) using 5 Å wavelength. This range can be further extended to low q of 4×10^{-3} Å^{-1} using focusing optics with 8.1 Å. In the sample position Quokka supplies the user community with a range of measurement environments both standard and unique in the small angle scattering community. Some of these sample environments are, a Rapid Heat Quench Cell enabling a sample to be studied in situ following a thermal shock (-120 ºC to 220 ºC) [3]; The neutron Rapid Visco Analyser (nRVA) [4] enables SANS to be measured simultaneously with viscosity via an RVA – an instrument widely used within the food industry; In-situ Differential Scanning Calorimetry (DSC) [5]; A stopped flow cell, and a RheoSANS. In 2016, over 220 days of user experiments were run on QUOKKA. Outputs from QUOKKA have been published that cover such diverse fields as magnetism, structural biology, mineralogy, polymers, food science and soft matter [6]. We present here a selection of recent scientific highlights.

[1] http://www.ansto.gov.au/ResearchHub/OurInfrastructure/ACNS/Facilities/Instruments/Quokka/

[2]E.P. Gilbert, J.C. Schulz and Terry J. Noakes, Physica B, 385-386 (2006)1180-1182.

[3]Stewart A Pullen, Elliot P Gilbert, Scott R Olsen, Edward A Lang and Kenneth RDoolan, Measurement Science and Technology 19 (2008) 65707-65714.

[4]James Doutch, Mark Bason, Ferdi Franceshcini, Kevin James, Douglas Clowes,Elliot P. Gilbert, Carbohydrate Polymers, 88 (2012) 1061–1071.

[5]S.A. Pullen, N. Booth, S.R. Olsen, B. Day, F. Franceschini, D. Mannicke andE.P. Gilbert, Measurement Science Technology, 25 (2014) 055606.

[6] https://neutron.ansto.gov.au/Bragg/proposal/PublicationList.jsp?instr=4