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## KOOKABURRA, the ultra-small-angle neutron scattering instrument at ansto: design and recent applications

The double-crystal ultra-small-angle neutron scattering (USANS) diffractometer KOOKABURRA at ANSTO was made available for user experiments in 2014. KOOKABURRA allows the characterization of microstructures covering length scales in the range of 0.1–10  $\mu\text{m}$ . Use of the first- and second-order reflections coming off a doubly curved highly oriented mosaic pyrolytic graphite pre-monochromator at a fixed Bragg angle, in conjunction with two interchangeable pairs of Si(111) and Si(311) quintuple-reflection channel-cut crystals, permits operation of the instrument at two individual wavelengths, 4.74 and 2.37  $\text{\AA}$  (Figure 1). This unique feature among reactor-based USANS instruments allows optimal accommodation of a broad range of samples, both weakly and strongly scattering, in one sample setup [1,2]. The versatility and capabilities of KOOKABURRA have already resulted in a number of research papers, including studies on hard matter systems like rocks and coal [3,4], as well as soft matter systems like hydrogels or milk [5,6]. This clearly demonstrates that this instrument has a major impact in the field of large-scale structure determination. Some of the recent examples will be presented here.

- [1.] Rehm, C. et al, J. Appl. Cryst., 2013, 46 1699-1704.
- [2.] Rehm, C. et al, J. Appl. Cryst., 2018, 51, 1-8.
- [3.] Blach, T. et al, Journal of Coal Geology, 2018, 186, 135-144
- [4.] Sakurovs, R. et al, Energy & Fuels, 2017, 31(1), 231-238
- [5.] Whittaker, J. et al, Int. J. Biol. Macromol., 2018, 114, 998-1007
- [6.] Li, Z. et al, Food Hydrocolloid, 2018, 79, 170-178.

### Topic

Neutron Instruments & Techniques

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