Contribution ID : **54** Type : **Poster**

# Position Resolved Profiling of Flocculated Sediment Structure with USANS

Gravity thickeners operate by mixing slurry with polymer to produce flocculated aggregates which settle much faster than isolated particles. Applying low shear rates through rakes and sloped walls, flocculated aggregates densify, making them settle even faster. Direct observations of aggregate densification have been limited to light scattering and video analysis. However, current analysis methods pre-suppose a fractal structure which becomes invalid as aggregates densify.

USANS (Kookaburra) experiments were conducted to quantify the impact of shear and compression on the structure of flocculated calcite aggregates through in-situ shear. Due to difficulties with maintaining constant shear, a novel new method was developed and trialed to spatially resolve the scattering of a sedimented sample as a function of vertical height by moving the sample relative to a rectangular aperture (nominally 4 mm high and 15 mm wide). Inspired by a spatially resolved SANS method (Harti, Strobl et al. (2017)), an adaption of this method with a modification of the USANS detector location has the potential for significantly improved spatial resolution. Promising preliminary results have recently been obtained by dark field imaging from sedimenting flocs at a test beam line at the Paul Scherrer Institute (Villgen Switzerland).

Current research seeks to produce vertically resolved data (1-D imaging) from the USANS Kookaburra instrument to quantify the impact of shear and compression on the vertically resolved structure of sediments formed from flocculated calcite aggregates subject to different shear histories, thus providing a basis for understanding how to best identify, quantify and exploit the aggregate densification phenomenon for large scale industrial processing.

Harti, R. P., M. Strobl, B. Betz, K. Jefimovs, M. Kagias and C. Grunzweig (2017). “Sub-pixel correlation length neutron length imaging: Spatially resolved scattering information of microstructures on a macroscopic scale.” Scientific Reports **7:44588**: 10.

## Topic

Neutron Instruments & Techniques

**Primary author(s) :** USHER, Shane (The University of Melbourne); GARVEY, Chris (ANSTO); STROBL, Markus (PSI); Dr DE CAMPO, Liliana (ANSTO); Prof. SCALES, Peter (The University of Melbourne)

**Presenter(s) :** USHER, Shane (The University of Melbourne); GARVEY, Chris (ANSTO)

**Session Classification :** Poster Session

**Track Classification :** Neutron Instruments & Techniques