

2019 Korea-Australia Rheology Conference: A Brief Report

The 2019 Korea-Australia Rheology Conference (KARC) was held on November, 15th in Daejeon. This was held as the opening session of the Autumn Meeting of the KSR. The ASR was represented by Dr. Anthony Stickland (President), Dr. Prabhakar Ranganathan (Treasurer) and Mr. Arif Mahmud.

As we have come to expect from these meetings, the talks were of a very high standard. The Conference opened with a fascinating plenary talk by Prof. Jae-Do Nam from Sungkyunkwan University on designing thermoset-based polymer composites by carefully selecting polymers and additives to achieve optimal rheological behaviour for 3D-printing. Prof. Nam is the recipient of the KSR's Lifetime Achievement Award in 2019 and his plenary talk was the Award Lecture.

This was followed by a second plenary talk by Dr. Stickland on the equally fascinating rheology of sludge and scum and its importance in wastewater treatment. Anthony presented the pioneering work of his group at University of Melbourne in bringing fundamental insights into the behaviour of compression rheology of sludge to achieve efficient sludge-handling in waste treatment facilities at Melbourne Water and other installations.

Following this were the following talks.

- Dr. Ranganathan (Monash University) spoke on applying rheological concepts to extract the complex mechanical response and energetics of single sperm flagella from high-resolution videos of beating sperm cells.
- Prof. Heon Sang Lee (Dong-a University, Busan) presented results of fitting the Leslie-Erickson theory through experimental data on shear rheology of aqueous graphene-oxide suspensions. This allowed interpretation of the data in terms of the microstructural dynamics of graphene-oxide domains. pH of the suspension is found to have a strong effect by changing the size and morphology of domains and their dynamics at low and high shear rates.
- Mr. Young Ki Lee (Seoul National University) presented his work with Prof. Kyung Hyun Ahn on the development and successful testing of multiphase Lattice Boltzmann simulations of particles at liquid-liquid interphases.
- Mr. Mahmud (U. Sydney) presented his work with Prof. Roger Tanner on experiments with oscillatory strain superposed on steady-shearing of non-Brownian suspensions. Their modelling suggests that frictional interactions between particles could explain the complex behaviour observed in the in- and out-of-phase stress response functions.
- Mr. Jun Mo Kim (Ulsan Natl. Instt. of Sci. & Tech.) presented his work with Prof. Chunggi Baig on using atomistic Non-Equilibrium Molecular Dynamics simulations of linear polyethylene melts to investigate the effect of molecular entanglements in shear flows. They propose that a simple dumbbell model accounting for effects such as chain stretching, orientation, disentanglement and intermolecular collisions can explain the different scaling regimes observed in the simulations.

The KARC session was followed by a visit to the impressive Korean Research Institute for Chemical Technology (<https://www.kRICT.re.kr/eng/main>). KRICT was established in 1976 and now focuses on development of eco-friendly chemical process technology for value-added green chemical materials and new pharmaceuticals. The Australian delegation was

given a tour of the facilities in the Chemical Platform Technology Division, which include a pilot-scale roll-coating facility that is used by Samsung and other industries. The visit was followed by a trip to the beautiful Uam Historical Park which is built around the scholastic retreat of the Joseon statesman and philosopher, Song Si-yeol (1607-89).

Overall, the conference was successful in continuing the ongoing relationship between our societies. As always, the Koreans were fabulous hosts and we thoroughly enjoyed the opportunity to see old friends and meet new ones. We look forward to hosting the next Korea-Australia meeting in 2021.

Dr Prabhakar Ranganathan

Dr Anthony Stickland