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Dynamic Assembly of Nanomaterials into Fiber

April 30 | Bldg. 101
Tuesday, 4 PM | Seminar Room on the 1st floor

Abstract: State-of-the-art, high performance materials, based on nanomaterials, have an essentially static structural framework that fails irreversibly without any dynamic response. Re-engineering the constituents may allow a dynamic response to stimulus without irreversible loss of mechanical performance in structurally well-defined system. To enable this approach, molecular interactions must respond at the certain levels and timescales without losing their features at the nanoscale. Recent advances in the chemistry of complementary nanomaterials will provide the means to adjust the strength of the interactions. For optimal performance, the constituents will need to be redesigned from the bottom up; however, in many cases, existing materials can be adapted by integrating new, dynamically responsive links. Whilst we are not intending to follow an explicitly classical approach, it is worth noting that most tough and strong fiber systems integrate liquid crystalline materials with soft, dynamic molecular phases. Our strategy is to introduce strong dynamic (reversible) interactions in a variety of length scales and geometries, in order to explore new strategies for the fabrication of functional materials. In particular this talk will highlight our recent works on chemical complementarity such as surface charge, polarizability, and surface functionalities to assemble into different dimensional forms.

References:

- [1] W. J. Lee, *et al.*, **Energy & Environmental Science** 7, 621 (2014)
- [2] W. J. Lee, *et al.*, **ACS Applied Materials & Interfaces** 8, 31500 (2016)
- [3] A. J. Clancy, *et al.*, **Chemical Reviews** 118, 7363 (2018)
- [4] H. Park, *et al.*, **Science Advances** 4, eaau2104 (2018)

Dr. Won Jun Lee is an Assistant Professor at Dankook University. He received the PhD degree from the Department of Materials Science & Engineering, KAIST in 2013 and carried out postdoctoral research at the Department of Chemistry, Imperial College London. He has a broad research interest in the "Macroscopic assembly of nanomaterials into structurally well-defined system", which includes: i) Liquid crystalline colloidal dispersions, ii) Macroscopic assembly of continuous and neat fiber, and iii) Nano-structured textiles for wearable devices.

You are cordially invited to attend!

Tuesday Colloquium