TBIS

Topic of the Speech:
π-π Stacking on Fibre Functionalization and Application in Wearable Device

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Dr. Xuqing Liu obtained his BS in Chemistry at the Lanzhou University, China. He went on to Chinese Academy of Sciences to start his research career in State Key Laboratory of Solid Lubrication (LSL), where his research focused on developing new synthetic lubricates and tribology chemistry and physics. Meanwhile, he served as secretary for Director of LICP, Academician and Professor Weimin Liu. After several years in LICP, he moved to the Hong Kong Polytechnic University, as a PhD student in the laboratory of Prof. YI LI , Prof Zijian Zheng, and Dr Juanyan Hu, studying the smart fibre and surface grafting polymer brushes. During 2013-2014, he was a PhD student in Prof Robert Young's group in the University of Manchester. Completing his doctorate in 2015, Xuqing joined the School of Materials in the University of Manchester as an independent Research Fellow, where he investigates the Fibre Surface Molecular Engineering. More than 50 research papers have been published in high-quality journals, such as Advanced Materials, Advanced Functional Materials, Small, NPG Asia Materials, Chemistry-An Asian Journal, Nanoscales, and Journal of Materials Chemistry.

My group utilizes the basic principles in chemistry, material sciences, textiles and fashion, to enable novel applications and development of flexible, stretchable electronics, energy devices and functional garment design.

1. Smart textile and wearable electronics; fibre based sensors and energy storage；
2. Functional Fashion, including waterproof, UV blocking, self-heating, moisture management, thermal regulation, and antibacterial fabrics;
3. 2D materials and functional nanomaterials;
4. Tribology in textile: hand feeling of garments; textiles reinforced polymer composite lubricants；
5. Sustainable development in the textile industry: waste textiles/garments regeneration, and natural dye.

Design Beautiful and Useful garments, to make people's life Better.

ABSTRACT SUBMISSION

-For invited speaker only

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ABSTRACT (NO MORE THAN 500 WORDS:)

Fibre surface modification is important in functional fabrics development and innovation. Traditional chemical bonding and crosslink technologies will damage the fine fibre structures and affect their intrinsic properties. π-π Stacking refers to attractive, noncovalent interactions between aromatic rings, since they contain pi bonds, which can be good approach in fibre surface modification. Our group employed Polydopamine, Tannic acid, and other polyphenols to modify various fibres, providing a perfect platform for catalyst absorbing and subsequent electroless deposition (ELD). By understanding the nucleation, growth, and structure of electroless metal deposits, the surface morphology of metal nanoparticles can be controlled in nanoscale with simple variation of the plating time. When the electroless plating time is 20 min, the normalized resistance (R/R0) of as - made conductive fibers is only 1.6, which is much lower than a 60 min ELD sample at the same conditions (R/R0 ≈ 5). This is because a large number of unfilled gaps between nanoparticles prevent metal films from cracking under bending. Importantly, the Kelvin problem is relevant to deposited conductive coatings because metallic cells have a honeycomb - like structure, which is a rationale to explain the relationships of conductivity and flexibility. This π-π Stacking also was introduced as an interfacial layers for fibre reinforced composites.