46th LEEDS-LYON SYMPOSIUM on TRIBOLOGY
Lyon, 2-4 September 2019

Invited talk

From fibre coating to Hair cosmetic properties: Tribology in daily hairy life

By Dr. Judith Wollbrett-Blitz

Hair Advanced Research, L'Oréal, France

Hair that emerges from the human scalp is a highly organized fiber. It is a unique composite material, with a rather well-characterized microstructure. It is well known that the hair surface and structure of both cuticle and cortex can be altered by chemical treatments and daily-life routines (combing, brushing, UV exposure….). Many of the sensorial aspects concerning hair relate to friction. The condition of the hair surface is crucial in terms of cosmetic product applications and sensorial appraisal. Coating or damaging the surface can lead to very different surface states and hence to non-negligible differences in surface properties.

These changes clearly impact the sensory feeling. Predictive evaluation by a rapid scanning of different coating can be very useful but it is previously required to understand the relation between different scales (from microscopic to nanoscopic) and between morphology and tribology. In the present study, we aimed at understanding the link between the tribological behaviour and surface properties in terms of topography. Multi-scale tribological, mechanical and topographic methods were used, to deal with some issues such as biologically induced heterogeneities and fiber geometry. Coupling very different technics helps at addressing the following questions: Is the roughness linked to friction parameters? What is the contribution of nanoscale roughness to large scale tribological measurements? How does the surface (bio)chemical composition impact surface adhesion? Can we predict the mechanical behaviour by a surface scanning?

Several techniques, such as friction measurements and mechanical surface properties were used to investigate tribological properties of hair/hair interactions. Novel techniques derived from hair wettability measurements were also used to bring new mechanical insights into fiber /fiber interactions by measuring hair / hair adhesion forces.