Dr Tao Chen is a senior lecturer in the Department of Chemical and Process Engineering at the University of Surrey. From 2014 to 2015, he collaborated with Unilever through a Royal Academy of Engineering Industrial Fellowship to investigate in silico modelling methods for skin research.
In silico (computational) models are increasingly used within the pharmaceutical and cosmetic industry to rapidly develop an understanding of the interaction between chemicals and human cells and tissue. Dr Chen’s research expertise in developing mathematical models for optimising biomedical processes was used to explore how these tools could be used in industry. He decided to work with Unilever to deepen his research understanding and help the company develop its work in this area. “In silico modelling is an important non-animal approach for skin research, and a priority area for Unilever’s digitally enabled R&D,” he explains.

The collaboration focused on developing models that could predict how the skin absorbs topically applied chemicals. Dr Chen worked with Unilever to use computer models to further explain the role of hair follicles in the dermal absorption of chemicals.

Unilever is a global leader in everyday household products, including several major health and hygiene brands. The Fellowship helped to consolidate a strategic partnership established between Unilever and the University of Surrey in 2013.

The collaboration significantly extended the capability of Dr Chen’s computational model. A series of systematic studies of dermal absorption provided essential data for Unilever’s personal care business relating to both product efficacy and safety.

The collaboration resulted in several follow-on projects and successful joint bids for funding, with more underway. It also helped to foster other collaborations with Unilever, in projects connected to formulation and powder technology.

Along with inspiring several master’s dissertation projects, the experience had a tangible impact on Dr Chen’s teaching. “Verbal feedback from my students is that the use of real-world examples from this collaboration has helped them in linking theory to practice,” he says.

“The Fellowship has had a long-lasting impact on my vision for my academic career, in terms of research focus, collaboration and my aim to deliver high-quality teaching.” continues Dr Chen. “Moreover, it has led to a number of additional research opportunities, demonstrating that the Fellowship has been positive for both Unilever and the university in terms of continued collaboration.”

The Industrial Fellowship scheme provides an invaluable opportunity for early- to mid-career academics to undertake a collaborative research project in an industrial environment. The scheme aims to strengthen the strategic relationship between the university and the industry host by providing an opportunity to establish or enhance collaborative research between the two parties and enhance the quality of teaching.