



Scientist in Profile

Dr Pamela Martin

Dr Pamela Martin is a Senior Scientist with the Advanced Materials & Product Development Unit at the Tun Abdul Razak Research Centre (TARRC), the UK-based research and promotion centre of the Malaysian Rubber Board. Her recent research to better understand how fillers influence the process behaviour of tyre compounds and affect the finished tyre's rolling resistance, wet grip and wear performance is said to be ground breaking and has led her to be recognised by the Rubber Division of the American Chemical Society who honoured her in May 2019 with the Sparks-Thomas Award. The award recognizes and encourages outstanding scientific contributions and innovations in the field of elastomers by young scientists, technologists and engineers.

Pamela was trained as a chemist, graduating from the University of Exeter, with a first class MChem, followed by a PhD from the University of York, specialising in materials science of liquid crystals. Pamela joined TARRC in 2008 to work on epoxidised natural rubber (ENR or Ekoprena®) reinforced with silica. Her work developing tyre tread compounds using silica-filled Ekoprena® has been guided by the tyre industry's demand for performance, coupled with sustainable and environmentally-friendly products. The technology proves to give the key benefits of low rolling resistance and high wet grip.

She has been involved in work associated with the improved understanding silica interaction with Ekoprena®. This has included investigations of silica surface modifications using coupling and non-coupling silanes and has resulted in improved processing and enhanced physical properties of silica-filled rubber compounds. Her work in this area contributed to a European Patent for TARRC, titled "Improvements in the mixing and processing of rubber compositions containing polar fillers" being granted in 2017.

Pamela has also been involved with research work on rubber blends, primarily development of Ekoprena® and natural rubber blends for tyre sidewalls, with the aim of achieving optimal distribution of silica filler and crosslinks to improve the products performance.

Dr Martin first led a project started in 2016, investigating the influence of rubber-filler interaction on the longevity of green tyres and specifically studying ENR interactions with silica, drawing comparisons to SBR interactions with silica and NR with carbon-black. This work has utilised techniques such as "Network Visualisation" – Transmission Electron Microscopy to visualise the nano- and micro-structure of filled polymers at or near tyre tread surfaces. Key differences in the mechanism of wear for laboratory-worn test pieces and road-worn tyres were identified, providing insight into why many laboratory abrasion tests are unreliable predictors for road wear performance. Pamela is currently co-leading a joint project between TARRC and the Rubber Technology Centre (RTC), Malaysia titled "Wear Performance of Speciality Rubber Tyre Tread" with the target of developing NR and Ekoprena® prototype tyre tread compounds with enhanced mileage, without compromising wet grip or rolling resistance of the current technology.

Pamela has extended her role and taken part in the internal auditing team for TARRC since 2011. ISO 9001, ISO 17025 and UKAS accreditations for a range of testing and calibration in the laboratories.

Pamela is also involved in the provision of consultancy services, including evaluating new materials and additives for rubber compound development and advisory services to the rubber related industries. She has taken an active role in the technical promotion of Ekoprena® apart from being as author or co-author of a number of published papers and presentations at international conferences.