

On the existence of a friction-modified surface layer of BR/SSBR elastomers reinforced with different silica or carbon black contents

Milad Mokhtari^{1}, Dirk J. Schipper¹ and Tetyana V. Tolpekina²*

¹: University of Twente, Faculty of Engineering Technology, Surface Technology and Tribology, P.O. Box 217, 7500 AE Enschede, The Netherlands.

²: Apollo Tyres Global R&D B.V., Colosseum 2, 7521 PT, Enschede, The Netherlands.

**Corresponding author: Milad Mokhtari (m.mokhtari@utwente.nl).*

Pin on disk friction tests are performed on different rubber samples in contact with a granite sphere. The rubber samples are prepared from a combination of butadiene rubber (BR) and solution styrene-butadiene rubber (S-SBR) reinforced with different amounts of carbon black or silica. The friction tests are performed at different velocities and loads. Mechanical changes inside and outside the wear track are determined by Atomic force microscopy (AFM) nano-indentation. AFM is used to determine the nanoscale mechanical properties which are compared with the macroscale mechanical properties measured by Dynamical Mechanical Analysis (DMA). The existence of a friction-modified layer as a function of the operational conditions and its effect on friction and friction modeling of a rubber in contact with a rough surface as a function of reinforcement filler and its content is discussed.

Keywords: friction-modified surface layer, BR/S-SBR, AFM nanoindentation, mechanical properties, rubber friction.