WET SKID RESISTANCE PREDICTION WITH BROADBAND DIELECTRIC SPECTROSCOPY

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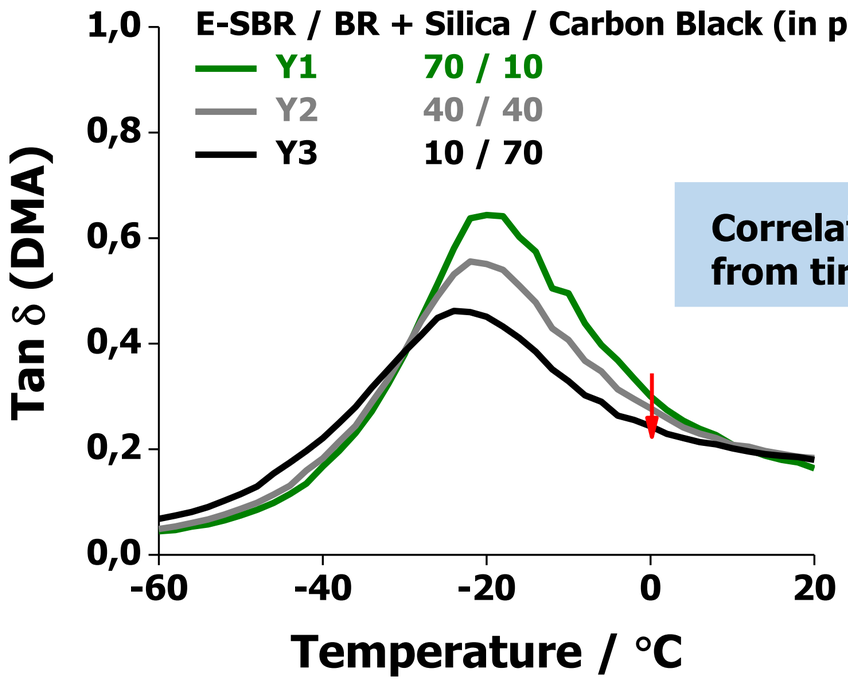
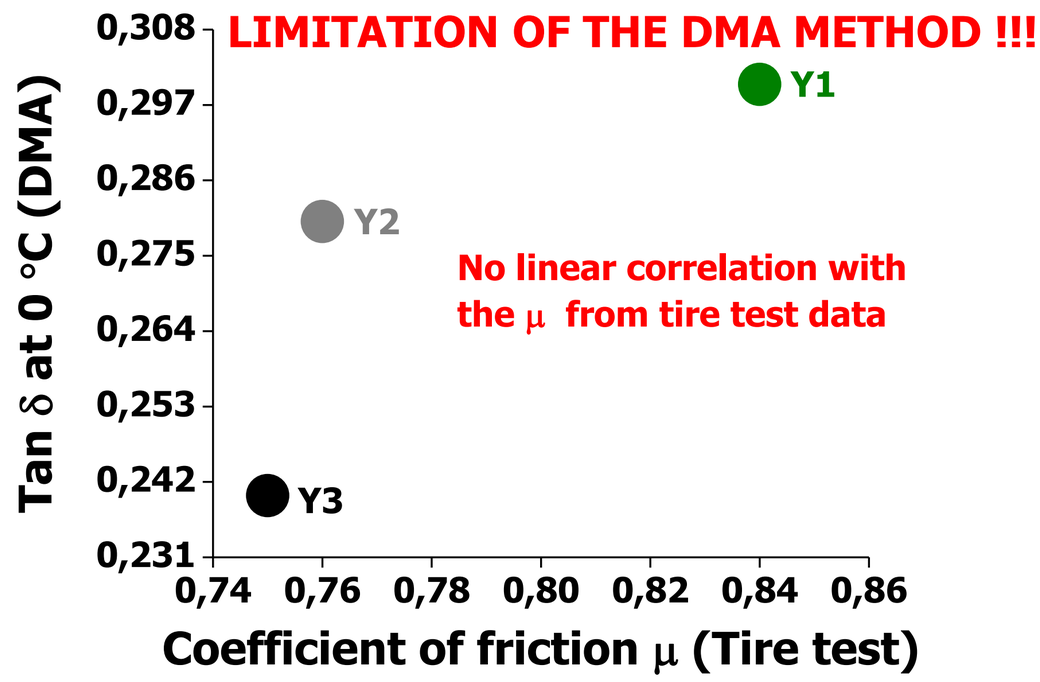
Existing method for prediction of Wet Skid Resistance (WSR) : Tan δ at 0 °C / 1-100 Hz from DMA

The DMA measurements have been done in tension mode in the range of -60 to 20 °C at a static strain of 10%, dynamic strain of 0.5% and a frequency of 20 Hz. The coefficient of friction (μ) has been measured under wet road conditions at 65 km/h from real tire tests.

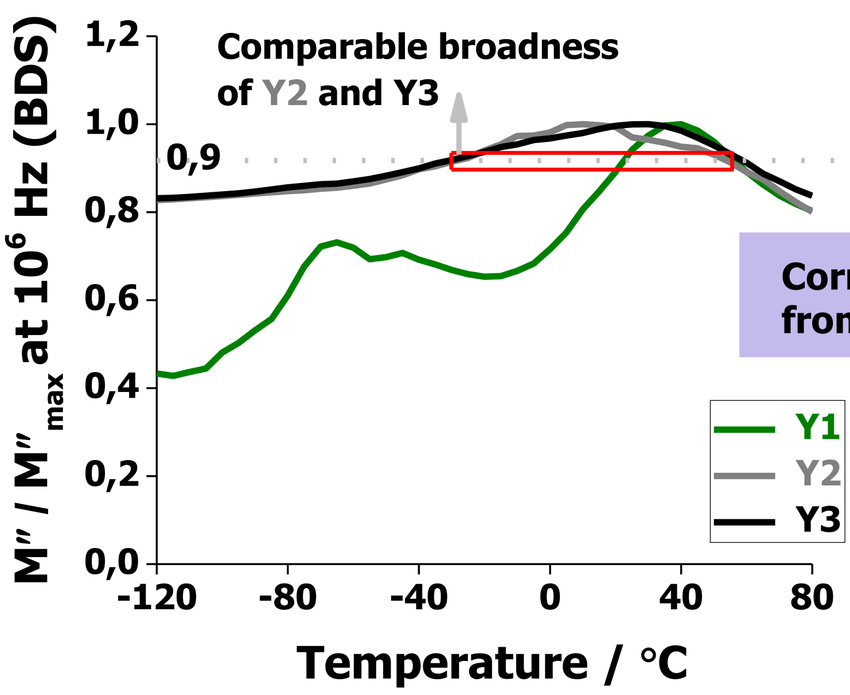


Correlation with μ from tire testing

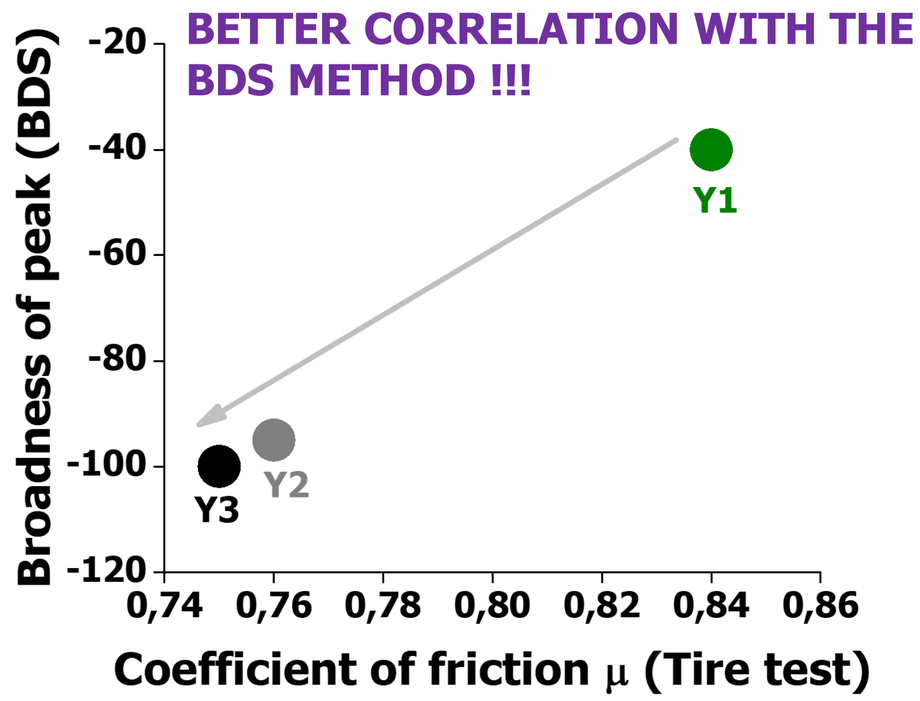


Proposal for prediction of WSR : Testing viscoelastic behavior at frequencies related to skidding (10^4 -10^7 Hz) with Broadband Dielectric Spectroscopy (BDS)

The BDS measurements have been done in the range of -120 to 80 °C and 1 to 10^6 Hz in a parallel plate geometry. Based on a speed to frequency conversion (Frequency = Speed / micro-roughness of the road), the frequency of the tire test is ca. $3.6*10^7$ Hz.



Correlation with μ from tire testing



CONCLUSION

For the three compounds studied, the BDS method delivers a good correlation with the coefficient of friction μ from the tire test measurements at 65 km/h in wet road condition.

∴ BDS seems to predict the WSR more reliable than the existing DMA method.

REFERENCE

Rathi, A., Investigation of safe mineral-based and bio-based process oils for tire tread application, PhD manuscript in preparation, 2019, University of Twente : Enschede, p 191-226.

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