## Imaging and spectroscopic analysis of bitumen surface

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Bitumen is an important industrial product of mineral oil refining and is used mostly for the production of asphalt concrete, i.e. a mixture of bitumen and mineral aggregates. Its other main uses are waterproofing materials for asphalt roofing board and for other insulation purposes.

The global bitumen market volume was valued at USD 71.44 billion in 2013 and is likely to reach USD 93.38 billion by 2020 [1]. Yet the microstructure of bitumen is not completely enlightened.

In the past AFM (atomic force microscopy) was used to picture the topology of bitumen at a sub-micrometer level and spectroscopy (FTIR, Raman and fluorescence) was applied to gather chemical information [2,3,4,5]. Here we combine AFM and Raman, which allows a direct linking. This visualization provides important information on the core-shell particles within the microstructure (asphaltene micelles) and will allow clues concerning the mechanical properties and the aging behaviour of bitumen at a macroscopic level.

<sup>[1]</sup> http://www.transparencymarketresearch.com/pressrelease/bitumen-market.htm accessed June 2015.

<sup>[2]</sup> B. Hofko, L. Eberhardsteiner, J. Füssl, H. Grothe, F. Handle, M. Hospodka, D. Grossegger, S. N. Nahar, A. J. M. Schmets, A. Scarpas. *Mater. Struct.* **2015**, DOI 10.1617/s11527-015-0541-6.

<sup>[3]</sup> G. Reena, S. and K. Verinder. Res. J. Chem. Sci. 2012, 2(8), 31-36.

<sup>[4]</sup> Z. Nai, T. Zuoji, L. YingYing, W. HuiTong, S. FuQing, M. JianHua. Sci. China: Earth Sci. 2007, 50(8), 1171 – 1178.

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