

6<sup>th</sup> International Conference on

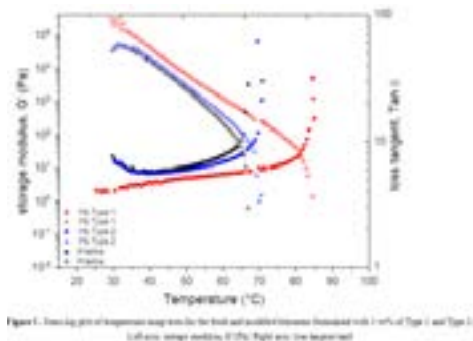
# Physical and Theoretical Chemistry

September 02-03, 2019 | Zurich, Switzerland

## Chemical physical characterization of multiwalled carbon nanotubes and its rheological effect on bitumen

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The present work aims to investigate the role of multi-walled carbon nanotubes MWCNTs on the structure of bitumen and their use as modifiers for binder. Since Iijima discovered them in 1991, CNTs have attracted enormous research attention due their amazing effects on properties of MWCNTs based composites. A MWCTs are a special CNTs where multiple single-walled carbon nanotubes are nested inside one another. They are characterized by high Young's modulus, good tensile stability, high thermal conductivity and surface density. The bitumen is a colloidal system, where the asphaltenes (polar phase) are dispersed in the maltene (oil phase), it is possible to increase mechanical performances by using MWCTs as modifier. The MWCNTs change the microstructure of bitumen generally characterized by nano-meter sized aggregates of polar molecules (asphaltenes) organized in hierarchical structures, stabilized by resins and dispersed in an apolar phase of paraffins and aromatic oils (maltene) inducing high resistance effect to mechanical stresses. Two different types of MWCNTs were tested: one is a product obtained by laboratory synthesis through Catalytic Chemical Vapour Deposition (CCVD) technique and other one is a commercial one. Microstructures of multi-walled carbon nanotubes and the rheological behaviour of modified and unmodified bitumens were investigated. The two different type of MWCNTs were characterized from structural and morphological point of view by TEM, micro-Raman spectroscopy and TGA techniques. Hence, the bitumens modified by MWCNTs were analysed through DSR experiments.



### Recent Publications

1. S. Iijima (2002) *Physica B* 323 (1)
2. A. Akbari Motlangh, A. Kiasat, E. Mirzaei, F. Omidi Birgani (2012) *World Applied Sciences Journal* 18 (4):594-599
3. V. Loise, D. Vuono, A. Policicchio, B. Teltayev, A. Gnisci, G. Messina, C. Oliviero Rossi (2019) *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 566:113-119

### Biography

Valeria Loise was born in 1986 in Cosenza, Italy. She received her Master's degree in Chemistry, in 2016 at the University of Calabria. She has attended her PhD in "Life of Sciences" at the same University, working on the effects of the rejuvenator on the bitumen, since 2017. Her major area of expertise is the study of colloidal systems. In particular, she focuses on the chemistry of bitumen and its additives, approaching the open challenges in this area of research from a chemical point of view, also making use of investigation and analytical techniques never used before to study asphalt binders.