



PhD position (CRPP UMR 5031 CNRS Université de BORDEAUX- FRANCE):

Novel Generation of Stimuli Responsive Bitumen

Bitumen issuing from natural resources exhibit exceptional adhesion, water repellent and mechanical properties and is mainly employed in pavement applications. The intimated bitumen composition is rather complex (saturated, aromatic, resins and aliphatic molecules). It can be viewed as colloids made of asphaltens “particles” more or less dispersed in maltens. In both pavement applications and in geothermic ones, we aim at producing novel generation of bitumen bearing heat and electronic transport properties. A step-by-step approach is expected as presented hereafter at a glance.

1/ Powdered colloidal adjunctions within bitumen while searching for: colloidal percolation thresholds, evolution of novel viscoelastic properties, novel heat capacities, novel electronic charge transfer behaviors, novel electro-induced healing of modified bitumen.

2/ Bitumen discrimination through asphaltens and maltenes segregation, colloids dispersion into the maltenic phase and bitumen re-constitution with the same final endeavors as point 1/

3/ Generation of colloidal inks while using diverse bitumen fluxents as solvent while searching for: colloidal percolation thresholds, evolution of the novel viscoelastic properties, novel heat capacities, novel electronic charge transfer behavior, and introduction into several bitumen grades, with final endeavors as point 1.

4/ Aside, final stimuli responsive bitumen will be tested for geothermal heat transfers

This research program is overall dedicated towards the physical chemistry of complex fluids and colloids where fundamental research and innovation are interplayed. As such highly motivated applications are expected. The program will be fulfilled under a collaboration with Eurovia belonging to the Vinci group. We would like to underline that a PhD funding is already acquired on this project that has to start in September 2021.

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