A new generation of environmentally friendly additives with foaming and anti-aging properties for use in bitumen: experimental and modelling studies

The project is interdisciplinary and covers the areas of chemical, civil and environmental engineering. It will be carried out by a consortium of Lublin University of Technology (Leader) and Poznan University of Technology (Partner). The aim of the planned research is to design functional zeolite-organic composites made of zeolite matrices and a various group of silanes, lignins and lignosulfonates. The essence of their performance will be the long-term and controlled release of zeolite water and the inhibition of ageing processes in bitumen binders. As part of the project, different types of zeolite matrices will be synthesised and characterised with the application of waste materials from the energy industry (fly ash). Then, organic compounds from the group of silanes and lignins will be attached to the obtained zeolite matrices in order to synthesise two-component composites used for the foaming and ageing inhibition of bitumen binders, which are used in the construction of road surfaces. The use of the composite materials developed in the project will make it possible to reduce the temperature of asphalt mixture production, which is directly associated with lower emissions of CO_2 and other harmful greenhouse gases into the atmosphere. On the other hand, inhibiting the ageing processes of bitumen binders makes it possible to extend the service life of road surfaces, which has a beneficial effect on the use of non-renewable mineral resources and is perfectly in line with the challenges of a sustainable economy.