



Raman spectroscopic evaluation of the dissemination of road de-icers in the environment

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Raman spectroscopy is nowadays a well established technique for the investigation of the molecular structure of a substance (solid, liquid or gas) through the study of its vibrational properties. This technique has been shown as particularly adapted for the characterization of water and aqueous solutions. The ERA 31 of the CÉTÉ de l'Est is developing methods based on that technique for domains such as water pollution detection and pollutant dissemination, mainly linked to transport infrastructures.

A specific application of the Raman spectroscopy is the monitoring of the road de-icing materials' evolution after application on the road's surface. Indeed, in order to avoid traffic disruption during winter, roads and airports are the subject of a specific maintenance based on the application of de-icing materials. However, these chemicals are transported out of the roads, and end up either in the surrounding environment (splashed out by the vehicles or blown away by the wind) or in ponds used for road water runoff remediation and flow control (by flows after precipitations). The first aspect of the road de-icing surveillance is therefore their follow-up in the transport infrastructure's surrounding environment. A spectroscopic tool was hence developed for the measurement of these products on roads and in water located next to transport infrastructures, and adapted for the measurement on soils. The second aspect concerns the tracking of the de-icing material in the detention ponds. The instrumentation of a specific pond has been set in order to determine the road de-icing material's evolution and influence on the pond's environmental media (water, soil and vegetation). The goal is to evaluate in what way and how long, the road de-icer will spread in a detention pond. It will permit us to estimate the pond retention period, as well as its remediation efficiency.