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BOOK OF ABSTRACTS

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Raman spectroscopy and SERS methodology for the analysis of a melamine admixture superplasticizer for concrete

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Admixtures used in concrete are natural or artificial compounds which are added in the kneading water to improve some properties of the fresh and the hardened concrete, such as durability, workability, mechanical strength, etc. Admixtures are classified according to modified properties and are defined as plasticizers, air entrainers, accelerators, retarders or superplasticizers and are added in concentrations below 1%. Due to the low concentration of admixtures it is difficult to monitor them after the interaction with the cement particles. This work is focused on a methodology to study a superplasticizer admixture based in polymerized melamine with Raman Spectroscopy and Surface Enhanced Raman Spectroscopy (SERS). The admixture is commercialized as a transparent liquid of high density where the polymerized melamine is dissolved. A drop of admixture has been heated at 40ºC degrees during four hours to evaporate the solvent; the quantity of the solid in the commercial admixture has been calculated at 21% in mass. The polymerized melamine has been analyzed with Raman spectroscopy before and after a heating treatment at 40ºC, thereby Raman spectrums of the admixture have been obtained as liquid and as solid (Fig. 1a). Besides, a SERS study of the same molecule has been done analyzing the commercial liquid admixture, and the solid left after the heating treatment by diluting the polymerized melamine in distilled water at 21% in mass (Fig. 1b).

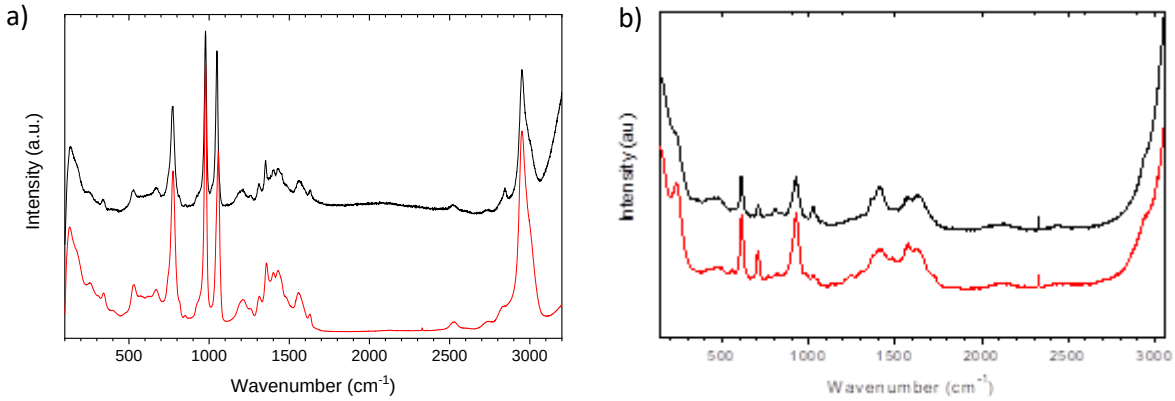

Figure 1. a) Raman spectrum of the melamine admixture before heating treatment (black) and after (red) and b) SERS spectrum of the melamine admixture before heating treatment (black) and after (red)

Results indicate that the polymerized melamine is not degraded during heating treatment, besides, Raman spectrum show signals which below to the aromatic ring at the melamine and other signals which correspond to the polymer. It has been tested that SERS technique is viable for the analysis of polymerized melamine as superplasticizer admixtures in the experimental conditions considered, being possible to identify characteristic signals of the aromatic ring of the melamine at 922 and 1030 cm^{-1}.

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