STUDY OF ORGANIC/INORGANIC SUSPENSIONS: THE CASE OF CEMENT SUSPENSIONS CONTAINING LATEXES.

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Cement can be considered as a reactive suspension that evolves over time. The addition of latex particles to the cement suspension has considerable benefits on adhesion and cement mechanical properties [1-2]. However, there is still a lack of knowledge concerning the link between the latex structure, the interaction of polymers with the mineral suspension and the mechanical property of this organic/inorganic nanocomposite. It is difficult to identify and characterize the relevant parameters that trigger the mechanical properties of cement and therefore to develop sufficiently well controlled materials.

Here we present a "step-by-step" physicochemical approach to studying the interactions between latex and cement suspensions. Commercial latexes are often sold as powders after a spray drying process during which mineral charges are added. The first step was to selectively remove these charges by an adapted centrifugation protocol which could distinguish the two types of particles. This process is efficient because most of the fillers can be removed from the commercial latex. The second step was to study the behavior of commercial cleaned latexes in the cement pore solution. During the third step we developed a method to quantify the latex/cement suspension interactions. Since the cement suspension is complex and reactive, we first carried out the study on a non-reactive system such as gypsum suspensions. The results shows the possibility of quantifying the amount of latex that “interacts” with gypsum and among them, we determined the proportion of irreversibly adsorbed latex. The first results put into evidence the strong attractive interaction between latex and gypsum. The next step will be to transpose this study to cement.

[1] Y. Ohama, Cement and Concrete composites, 1998, 20: p. 189-212.
[2] Ye Tian et al., Advanced Materials Research Vols. 261-263 (2011), 807-811.

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